The IRON AGE

Vol. 160, No. 3 July 17, 1947

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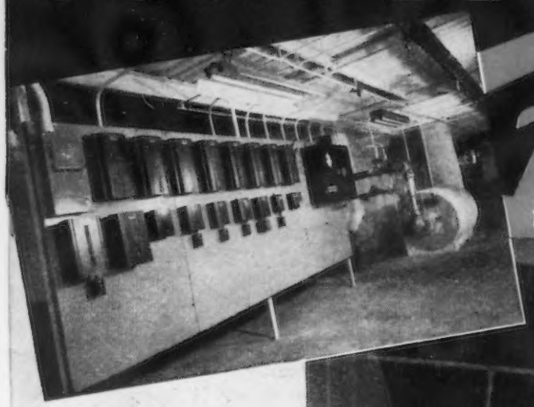
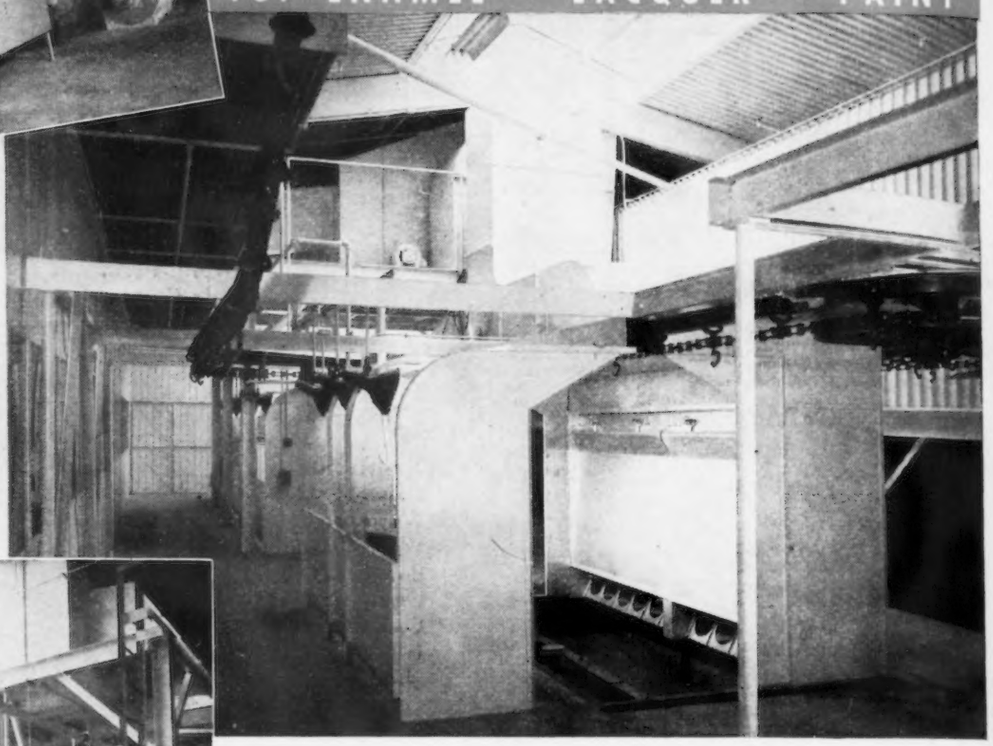
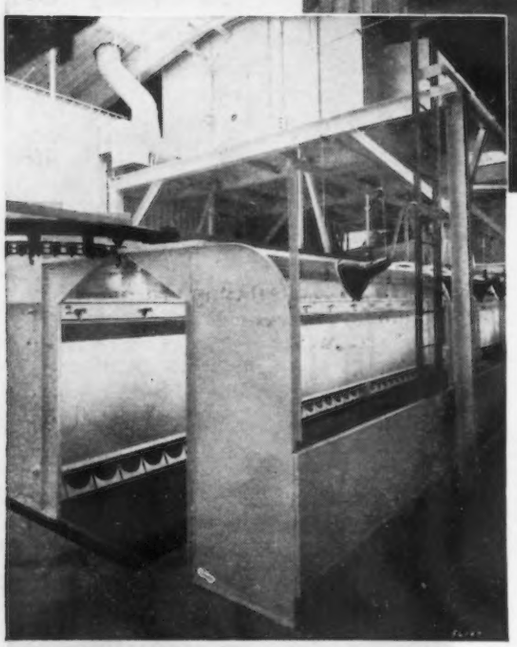




Above: Electrical Control Panel, and Automatic Temperature and Safety Controls for the Entire Mahon Finishing System installed at All-Steel Equipment, Inc., Aurora, Ill. At Right: General view of the same System Showing Interior of Spray Room, Filtered Air Supply, Hydro-Filter Spray Booths, and Drying Oven at Right. Three Stage Washer and Dry-Off Oven are Located just Outside Spray Room at the Left.



Mahon Hydro-Filter Spray Booths in the same Installation. The Fan and Filter Room is shown above the Spray Booths with the Drying Oven in the Background. Clean Filtered Air is Supplied and Maintained at Slight Pressure inside this enclosed Spray Room. The Air Supply Diffusers may be seen in the upper right hand corner of the Photograph.

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Action at Paris

THE 16 nations in uneasy assembly around the huge table in the French Foreign Ministry can hardly be unconscious of their role in shaping the world of the future. Their very fraternity in an "International Cooperation Committee" represents a final cleavage of East and West. And the bitter denunciation of the so-called "Aid to America" program emanating from the Moscow radio serves to quicken a sense of urgency and determination. Balance of power between East and West, a delicate thing at best, will in great measure be determined by just how well these nations subordinate their individual cherished prerogatives, control their fears and surrender their sovereign privileges.

It can hardly be denied that the 16 nations face a series of decisions of formidable complexity in compounding a coordinated plan for rehabilitating Western Europe. Somehow an economic scheme must be devised that will capture the imagination of American public opinion. Somehow 16 individual national economic plans—ranging from completely totalitarian setups through socialistic regimes to capitalistic economies such as in Belgium—will have to be shuffled together into a realistic program of mutual aid in reconstruction. The German Ruhr —a problem which deadlocked the Moscow conference—must immediately be revived. And a whole series of financial and monetary disparities must be ironed out before there can be hope of trade recovery and a retreat from the wave of hoarding and fear which strangles recovery in most Continental nations.

Britain will likely be faced with the necessity of giving up operational control of the German Ruhr. Failure to lift Ruhr coal output above a 50 pct prewar level stands in the way of European recovery, and the problems involved are beyond Britain's capacity to solve. After some rather abject fumbling of its own, a more dynamic American policy is being felt in the administration of the Anglo-American fused zones. A Ruhr authority will likely be created on the model of TVA, and a subsequent loan from the International Bank will speed the supply of new equipment and encourage rehabilitation. There is every likelihood of a heavy influx of American and French (who have been spectacularly successful in the Saar) technicians into the mines and offices throughout the entire Ruhr-Aachen area.

Next to the Ruhr, the Committee's most pressing problem is to encourage some realistic decisions regarding currency revaluation and credit stabilization. Again the German situation demands immediate priority if ever the demoralization and sense of futility in that country is to be checked. The United States bears heavy responsibility in this German debacle and must, therefore, be a party to rectifying the situation.

Also, with its dominant role in the International Monetary Fund, the United States has a definite obligation to lead the way in realistically revaluating the conversion rates of both its own and other currencies. France, particularly, is faced with a nasty problem of currency rehabilitation. But if it can be done, this one act alone will greatly diminish the need for American help. For hoarded gold and foreign exchange will be lured out of hiding and made available for productive investment, farmers will again send their surpluses to market, and a basis will be established to encourage direct foreign commercial credits.

Thus do the economic cooperation in Europe, the Marshall offer, Britain and France's dollar needs and German industrial recovery all interlock. If the Committee of Sixteen at Paris can turn the miracle and somehow rationalize all this into a promising pattern, then Congress has a moral obligation to allocate American resources. If the United States fails in meeting delivery promises of the necessary capital equipment, raw materials and food, the resultant disillusionment and despair could have no other end but gradual retreat into the ever-ready arms of Russia. And, as in Aesop's fable, there are no footsteps back from the bear's lair.

T. W. Lippert

It's *Men Like This* who Make Inland Steel

In the last analysis it is men, not machines, who make steel. And a steel is no better than the men who make it. Inland steelmen have grown up with steel . . . lived and breathed it all their lives. It is their judgment and skill . . . their genius for steelmaking . . . that is reflected in every ton of Inland steel. That's why you can be sure of quality and uniformity when you specify Inland steel—steel you can depend upon.

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► Approval of a broad European aid program along the lines of the Marshall plan would almost inevitably require the U. S. government to organize a world steel cartel.

► The new Ford pension plan may give added impetus to a trend toward eliminating the distinction between salaried and hourly paid workers. A group retirement plan for Ford salaried employees has been in effect since the first of the year for about 11,000 white collar workers.

► Doubling of the output of a blast furnace is theoretically possible by combining high top pressures, oxygen-enriched blast and beneficiated ore, according to competent authorities.

► Now on the market is a new aluminum siding fabricated with a slightly concave facing that permits it to be nailed directly to studs or sheathing on the side of a house--under tension. It is applied from the eaves down rather than the bottom up.

► Wall Street sages whose bon mot of a year ago was "Sell Kaiser-Frazer short" may be embarrassed to learn that K-F earned a profit for the second quarter of this year.

► This month electrolytic tinplate will for the first time surpass that produced by the hot-dip method. Shipment data for the year to date show hot-dipped tinplate still in the lead, but by the end of the year there is a chance that electrolytic will show a greater tonnage than hot dipped.

► Outstanding feature of Santocel, a new Monsanto insulating material, is 94 pct nothing. Reportedly twice as efficient as common insulating materials, it consists of 6 pct silica and 94 pct air. This space saving insulant has been instrumental in increasing household freezer capacity up to 60 pct without increasing the size of the unit.

► When new model automobiles appear they will have cost the manufacturer some 2½ to 3 times as much for tools as prewar models. Packard, for instance, has just spent about $1.5 million on engineering and tooling for its 1948 convertible--the first such model produced by Packard since 1941.

► Individuals are saving less these days. During the first quarter of 1947 U. S. individuals saved $1.4 billions--or less than half of the amount reported for the last quarter of 1946. The savings total is said to be the lowest since 1940.

► The West Coast will get its first electrolytic tinplate line probably late in 1948. One of the lines at Tennessee Coal, Iron & Railroad Co.'s Fairfield, Ala., plant is being moved to the Coast for installation at that point.

► Moscow reports that factory tests have been completed on the "Moskvich," a 55 mph car resembling the British Austin. Production, according to these reports, will reach 60,000 units a year during the next 4 years. Austin spokesmen say they have no trading agreement with the Russians, nor did they have any part in designing it.

► Army engineers are planning a prefabricated Arctic shelter hut to withstand a 125-mph gale and be relatively easy to heat in 70-below temperatures. Present designs call for two thin aluminum sheets with insulation between them for walls, floor and roof. Aluminum is used to reduce weight when transported by plane or glider.

► Egyptians are studying two possible steel plants. One is a rolling mill at Port Said to use scrap accumulated during the war to make reinforcing bars. A British firm is reported to have already bought land for this plant. A second plant contemplates smelting the reportedly rich hematite ore in the Assuan region. There are said to be 150 million tons of ore in this area which could be processed with power to be made available by the future hydroelectric station at Assuan.

► Scientists now hope to be able to launch small rockets from V-2 rockets at White Sands, N. M. and thereby reach altitudes of almost 600 miles. This will permit studies of interplanetary space which no other means have heretofore been able to probe.

Flaking in Alloy Steels

By S. W. POOLE
Metallurgical Laboratory
Republic Steel Corp.
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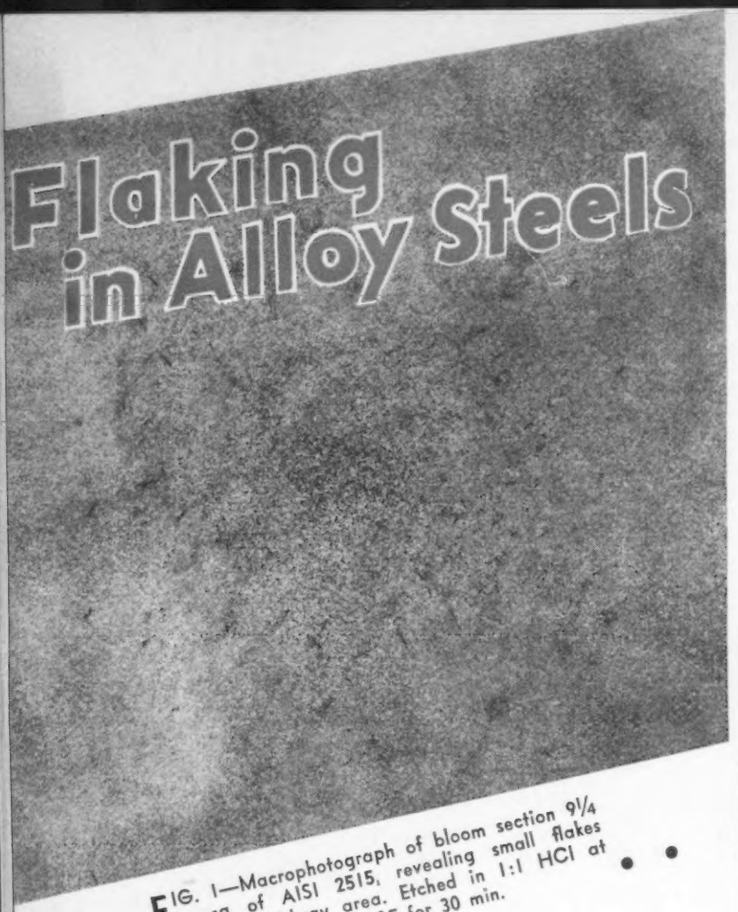


FIG. 1—Macrophotograph of bloom section 9¼ in. sq of AISI 2515, revealing small flakes present in midway area. Etched in 1:1 HCl at 160° to 180°F for 30 min.

Flaking, a problem that has confronted the alloy steel producer for many years, is discussed herein from the standpoint of the fundamental causes for this condition and means by which it can be minimized. Operating data are presented indicating heat treating cycles that have given successful results. The author also reviews several test methods for determining the presence of flakes in billets and blooms, including the use of the Reflectoscope.

FLAKING, a steel defect encountered in rolled and forged sections of alloy steel, has been a problem to the alloy steel producer for about the past 30 years. The flake, as it is commonly designated, is an internal rupture occurring generally in the midsection area of blooms, billets or heavy forgings when the proper cooling precautions after hot-working operations have not been observed. Because of the fact that an actual internal crack occurs in the formation of this type of defect, it is obvious that stress is the major factor in its formation. An example of this condition in an alloy steel billet section is shown in fig. 1.

In past years considerable investigation both in this country and abroad has been directed toward determining the essential facts involved in the formation of flakes and in methods for their elimination in the constructional alloy steels.

It is now generally believed that hydrogen plays an important role in flake formation. Another factor involved is the transformation stresses involved in cooling, particularly when these transformations can take place in localized areas at low temperatures. Residual stress remaining from hot working is also believed to exert an influence, and this contention is supported by the generally accepted fact that flakes do not form on cooling heavy sections from high temperatures unless some hot working has been performed. Stresses set up by contraction during cooling are also believed to be involved in the general theory concerning the formation of flakes.

At the present date the fundamental causes for flaking are still a somewhat controversial matter as exceptions to the generally accepted ideas can be found. Defects certainly resembling flakes and occurring in the midway section can be found in improperly cooled alloy steel ingots where obviously no previous hot working has been performed. Russell[1] states that he does not know of an experimental result which throws any light on the relative potency of hydrogen as a flake former when it is present in such quantities as are found in commercial steels. Woolman[2] reports that calculation of stresses in a homogeneous cooling mass shows that tensile stresses resulting from the transformation change as it passes from the outside to the center are always greatest at the axis or near the outer surface, but are a minimum in the intermediate regions where flakes are usually formed. It would appear from this contention that stresses produced in a homogeneous mass during cooling cannot therefore be

entirely responsible for flake formation and evidently some superimposed stress must be present to account for this phenomenon.

As a corollary to this, it might be stated that, if a uniform stress situation exists with respect to transformation reactions occurring through a homogeneous mass of steel, the transformation stresses, independent of their severity, will not cause flaking. This contention is borne out by observations on cooling of relatively large sections—4-in. diam rounds of air hardening analyses where flakes are not generally encountered.

It would appear in the cooling of large sections, 6 x 6 in. to 24 x 24 in., billets and blooms of alloy constructional grade steels, that high superimposed localized stresses caused by delayed transformations in stabilized austenitic segregates and by hydrogen effects are the major offenders.

In summarizing this brief discussion of the possible causes for flake formation it can be stated that there are many who believe that hydrogen is only part of the story. It is felt that transformation delay of austenite in segregated areas is the most useful point we know at this time in explaining the formation of the high localized stresses which promote flake formation.

Methods for Elimination of Flakes

As the general theory involved in flake formations indicates that hydrogen dissolved in the steel can play a prominent role, precautions can be taken to insure that the hydrogen content of the steel is at a minimum. Such precautions are involved with the raw materials used in producing alloy steel and the steel melting practice itself.

The sources of hydrogen in steel production may come from moisture, rust, oil in or associated with the steel scrap, and other raw materials involved in melting. In the production of alloy electric furnace steel, precautions are therefore taken so that moisture is at a minimum in such raw materials as burnt lime, fluorspar, and coke breeze used in making up slags. Scrap is also watched to avoid contamination with too much rust, oil or moisture.

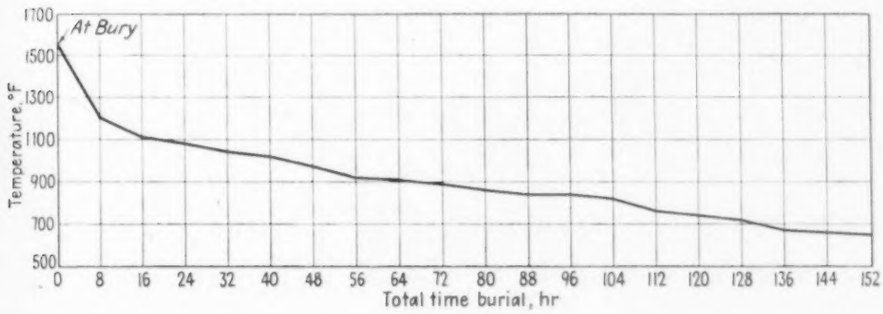
Control of the hydrogen content present in the molten steel can be effected especially during the oxidizing or meltdown period in basic electric furnace operations. It has been found that the hydrogen content of the steel can be influenced in two ways:

(1) A reduction in the hydrogen dissolved in the steel bath can be produced by a strong boiling action where carbon monoxide gas caused by carbon oxidation can remove dissolved hydrogen by a flushing action.

(2) In the second or refining period in the basic electric furnace when the steel bath is inactive and under a basic lime silicate slag of the plain or carbide type, hydrogen absorption by the molten steel can occur, particularly if moisture is present in the burnt lime, fluorspar or other materials used in making up the slag. Prolonged refining periods under the above conditions show a tendency toward the development of high hydrogen contents in the liquid steel at the tapping period.

Once the steel has been produced in ingot form and then rolled into blooms or billets, other considerations involving the prevention of flakes in the hot-worked steel become of major importance. In the early days of investigations on the nature of flakes, Hultgren[3] definitely showed that flakes can occur during cooling after hot working and also that if a forging or bar be cooled down to ordinary temperature between two operations of hot working, flakes may form. His investigations on cooling methods to prevent flake formation showed that with the type of steel under consideration, a high carbon-chromium bearing steel, that if the forged product was allowed to air cool to 138°F and buried, for slow cooling, flaking is eliminated.

The general practice of alloy steel producers in eliminating flake formation involves some type of slow cooling after rolling the blooms or billets.



LEFT

FIG. 2—A slag bury pit cooling cycle for type 4340 ingots size 8x8 in.

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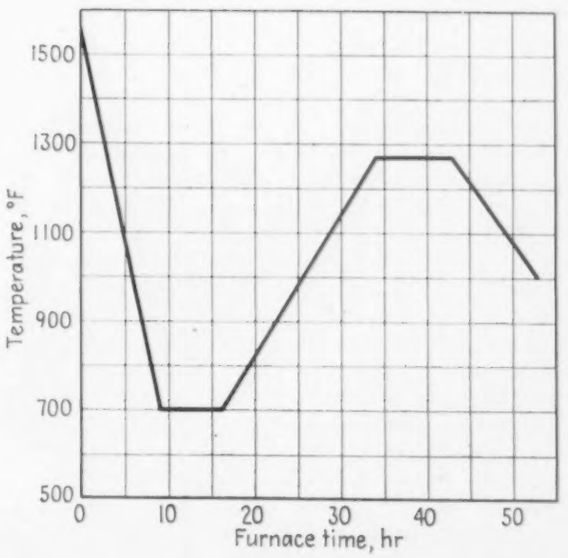
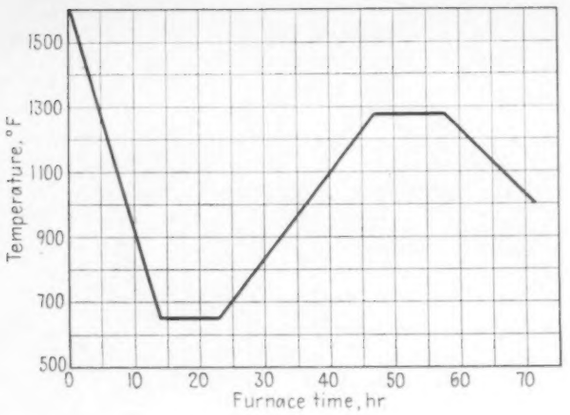
BELOW

FIG. 3—Furnace cooling cycle for type 2515 steel size 7½ in. square.





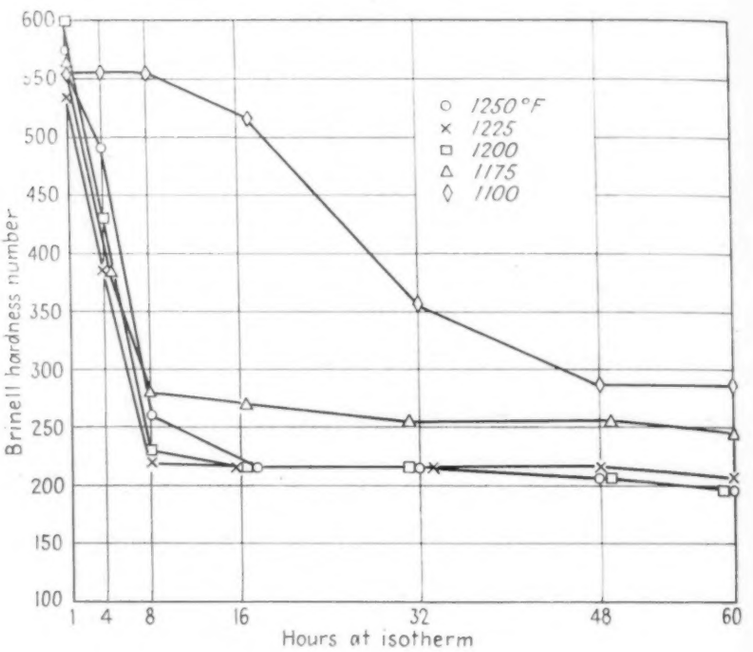
ABOVE

FIG. 4—Furnace cooling cycle for type 4340 steel size 12x12 in.

o o o

RIGHT

FIG. 5—Gun steel samples type 4340 (plus vanadium); 1-in. cubes cut from center to midway of 24x24 in. blooms; austenitized at 1750°F for 1 hr; furnace cooled to and held at temperatures as shown; water quenched.



The principal consideration motivating this type of cooling procedure has been the production of a steel structure possessing sufficient ductility to withstand, presumably by plastic yielding, any high superimposed internal stresses that might cause flakes to form as the steel is cooling from temperatures of 400°F to atmospheric temperature. Procedures for slow cooling utilized such methods as cooling in bury pits which pits can be simply covered by refractory brick-lined covers. Other methods involve burial in crushed blast furnace slag. Essentially, bury pits are much the same, since they all serve as an insulated chamber for slow cooling a charge of hot steel blooms or billets.

Although the bury pit and its modifications have been successful in generally controlling flaking, the long-time cycle involved and the increasing demands for greater tonnage during the war made it imperative that faster cooling methods be developed. An example of a slag bury pit cooling cycle is shown in fig. 2. Some early work by Bamberger[4] has been reported in which an annealing type of cycle was successfully used in preventing flaking in high carbon-chromium analyses and is substantially as follows: (1) Charge into furnace from hot-working operation, level off; (2) cool with furnace or at controlled rate to below Ar_1 thermal critical point, level off, soak; (3) reheat to just above Ac_3 critical point, soak; and (4) cool to room temperature at the rate necessary to give desired structure and hardness.

A later modification of this cycle involved only reheating to just above the Ac_1 critical point, soaking and then cooling to room temperatures at a slow rate. Transformation stresses on cooling presumably would be lower in this modified cycle due to the smaller amount of austenite formation at the reheating temperature.

A cycle developed from this earlier work involved cooling of the steel to temperatures in the range of 600° to 700°F, as for an SAE 4340 type, followed by a hold at this temperature. The charge is raised to a temperature below Ac_1 and again held, whereupon it is subsequently furnace cooled to 900° to 1000°F. Cycles of this type are shown in figs. 3 and 4.

Cycles of this type, where a cooling to a subcritical temperature in the range 600° to 700°F is followed by reheating to below the Ac_1 critical point, have proved very successful in eliminating flakes in alloy steel billets and blooms. The low temperature hold, it is thought, exercises a beneficial effect on hydrogen diffusion and also allows transformation of austenite to occur at a temperature range considerably above the range for flake formation. The long soaking period just below the Ac_1 temperature permits the development of softness and ductility and reputed further diffusion of hydrogen from the steel.

Kingsley[5] recommends for medium carbon-nickel-chrome-molybdenum types a rapid cool to 800° to 700°F, evening out with a holding time dependent on billet size, followed by reheating to 1250° to 1300°F and holding for specified time,

followed by furnace cooling to 1200°F. The same type cycle is used for the high nickel low carbon types, allowing austenite transformation to proceed at 750° to 650° F and then reheating to 1250° to 1300°F, holding, and furnace cooling to 1200°F.

Isothermal Annealing Cycles

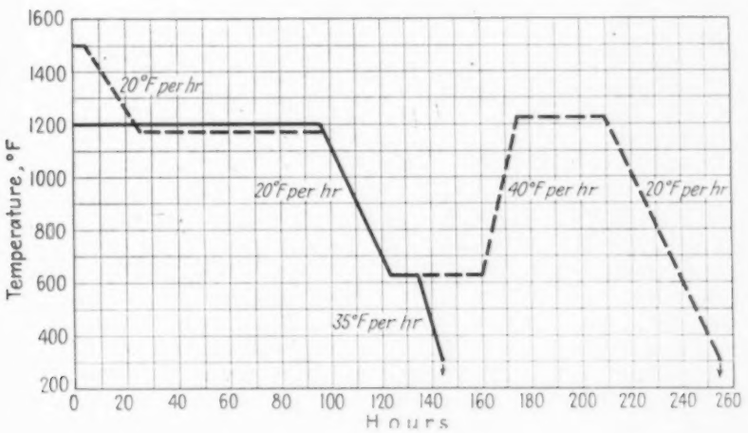
A considerable amount of research effort has been expended on the study of austenite decomposition at subcritical temperatures, and the mechanics of the reactions involved are rather well understood for the alloy analyses commonly produced (which are flake susceptible).

It would appear advantageous to develop a simpler type of cycle involving only a long holding time at a temperature that would develop the maximum amount of a ductile ferrite-carbide microstructure as a result of isothermal austenite decomposition. Experimental work indicating the results of laboratory work on isothermal transformation after continuously cooling from the austenitizing temperature, is shown in fig. 5 for a 4340 (plus vanadium) analysis, and the effect of the temperature level used for isothermal transformation of the remaining austenite is clearly indicated by the Brinell hardness developed.

Because of the fact that continuous cooling to the transformation temperature rather than quenching has been performed, transformation temperature, isothermal decomposition of the remaining austenite will proceed. It can be appreciated then that a rather long holding time at the isothermal transformation temperature may be a necessity.

Such is actually the case in practice, and furthermore, close temperature control is necessary to secure the optimum in ductility from the cycle, together with an additional time factor to allow for sluggish localized transformations, due to segregation, to occur. A 96-hr isothermal transformation period involved in the cycle used for cooling 24-in. sq gun bloom forgings of medium carbon-nickel-chrome-molybdenum-vanadium analysis is illustrated in fig. 6 (by the solid line) where furnaces and temperature control equipment are used which will give accurate temperature control during the cooling and the long isothermal hold. An alternate cycle for cooling these large 24-in. sq blooms when uncertain or inadequate temperature control is the case is shown by the dashed line in this figure. The additional reheat cycle in this case functions as a safety factor.

In the cooling of gun forgings with cross-sections up to 20 in. in diam, a cycle giving successful results is shown in fig. 7. In this case, after an initial leveling off at 1000°F, the steel is cooled to 700°F and held prior to reheating to above the Ac_3 point and then cooled slowly for a long isothermal hold at 1200°F for 96 hr. This cycle



LEFT

FIG. 6—Cycles used to cool large blooms up to 25 in. sq after rolling. Solid line indicates modified short cycle satisfactorily used with accurate temperature control. Longer cycle indicated by dash lines found necessary safety factor when temperature control not reliable. Steel analysis: 0.33-0.38 C; 0.60-0.80 Mn; 1.50-2.00 Ni; 0.70-0.90 Cr; 0.30-0.40 Mo; 0.05-0.10 V.

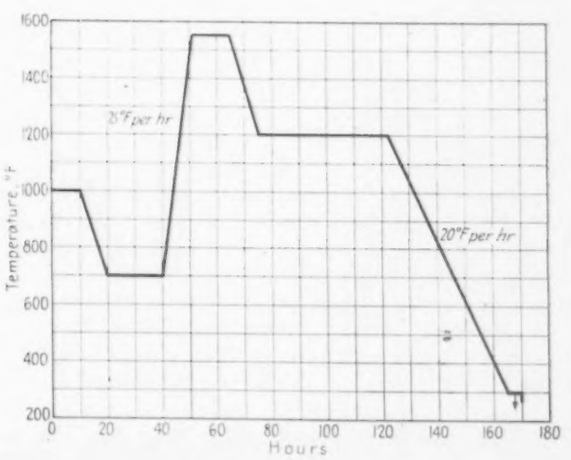
o o o

BELOW

FIG. 7—Cycle used to cool large forgings with cross-sections up to 20 in. in diam to protect against thermal stresses in cooling after forging. Steel analysis: 0.35-0.40 C; 0.70-0.90 Mn; 1.65-2.00 Ni; 0.70-0.90 Cr; 0.30-0.40 Mo; 0.05-0.10 V.

effects will not be the same as to time required or time to start transformation as indicated on TTT curves published for a particular analysis where quenching has been utilized to arrive at the transformation temperature. In cooling large blooms in an annealing furnace, a slow rate of continuous cooling is to be expected, and saturated austenite, ferrite and perhaps some carbide phase will exist when isothermal transformation starts.

Furthermore, time is required to level out the temperature through a charge of billets or blooms which may weigh some 50 tons total. Transformation after continuous cooling to the selected isotherm will start at the surface of a section and as the interior is leveled out with respect to



includes, due to reheating to above the upper critical point, a grain refining feature usually not incorporated into cycles involving direct rolled items.

Determining Presence of Flakes

Perhaps the most widely used procedure for determining the presence of flakes is the macroetch or deep etch test wherein a transverse section some ¾ in. thick, after carefully machining or grinding one transverse face, is etched in hot hydrochloric acid of 1:1 concentration at 160° to 180°F. The presence of flakes is quite readily revealed by this procedure. Fracture

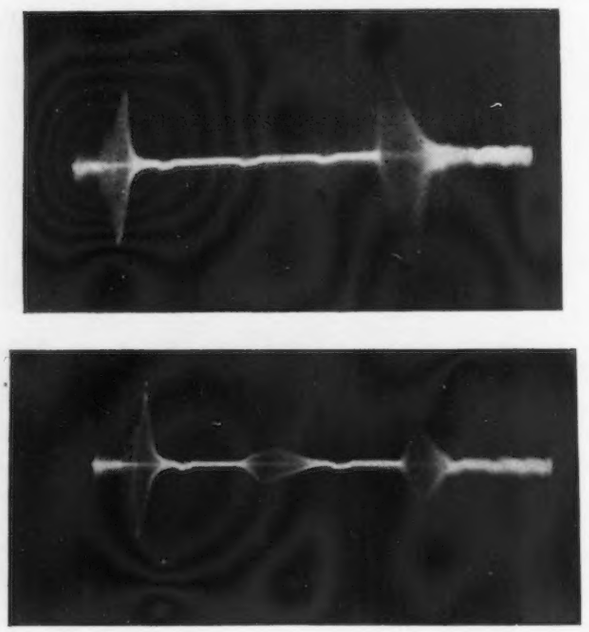


FIG. 8—Oscilloscope pattern on 6 in. sq billet; (top) indicates sound material, while a flake is indicated in pattern (bottom).

testing of hardened billet slices by fracturing longitudinally through the thickness of the slice will show flakes as bright areas present in the fracture surface. In badly flaked steel after heat treatment they can also be observed in tensile test fractures, where again they appear as bright areas on the fractured surface. In this instance they can contribute to a material lowering of the ductility values expected.

Perhaps one of the most interesting nondestructive methods which has been developed for the detection of internal defects in steel is the utilization of supersonics[6]. The supersonic reflectoscope developed by the Sperry Co. has been used rather extensively for the determination of flakes in billets and blooms of hot-rolled alloy steel.

In using the reflectoscope, the quartz crystal plate, at the end of a coaxial cable leading from the reflectoscope unit, is applied to the billet or bloom surface. A transverse sound wave passing through the section is reflected or echoes back from the opposite side. This state of affairs is indicated on an oscilloscope screen whereon an initial pulse from the crystal oscillation and the back reflection or echo can be seen separated by a straight or stepped line between. When a defect as a flake is present, a partial reflection of the initial sound wave from this discontinuity in the section is indicated by a peak or pip on the oscilloscope pattern between the initial and back reflection indications. This condition is illustrated in fig. 8, showing the appearance of an oscilloscope image. If the flake is oriented at 90° to the direction of the supersonic wave, a maximum indication is obtained; if it is almost parallel practically no indication is obtained.

As the position of the defect with respect to the cross-section of the section under test can be determined, it is an easy matter to check the findings of the reflectoscope by cutting suitable test pieces for macroetching.

In summarizing, with respect to the present status of the flaking problem, it can be stated that with the knowledge developed as to the causes and methods developed for the prevention of flakes this condition should be eliminated. After careful consideration as to proper melting practices and proper cooling conditions for blooms, billets, and forgings after hot working, flakes as a defect should not be present. With heavy forgings and large bloom sections, cycle annealing, using good temperature control equipment with circulating type furnaces, appears to be the most effective means for elimination of flakes in these types of products.

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[5] Kingsley, Metal Progress, April 1945, p. 699.
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Survey of Precision Casting

AN outline of the foundry technique required, working limits and progress difficulties and a survey of present day production and expected applications of precision investment castings is given in the article "A Survey of Precision Casting," in the April 1947 issue of the British publication *Metallurgia*. The discussion is summarized by the author with the statement that provided a pattern can be made, any component from ½ oz to ½ lb in any known alloy can be cast to ±0.005 in. per in. The article also contends that after heat treatment, such components will be comparable to the average forging, die cast or machined block and that the less the number of parts required, the greater the savings in time and cost.

Spectrographic Analysis Of Stainless Steels

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THE chemical analysis of stainless steels by the use of the spectrograph has been more difficult of accomplishment than the analysis of nonstainless steels, aluminum or magnesium alloys. The principal difficulty arises from the fact that although with the latter alloys the matrix element, iron, aluminum or magnesium, serves as the internal standard by virtue of its composition remaining constant within a 2 pct variation above 90 pct content for all alloys of the family, in stainless steels the matrix element iron does not maintain such constancy for all variations of the stainless family and therefore does not serve as an internal standard.

For the analysis of only one member of the stainless family, for example the 18-8 alloy, Steele and Johnston[1] have reported satisfactory spectrographic analyses with the matrix element iron as the internal standard. Post, et al[2] have attempted to span the nonconstancy of the matrix element in the entire stainless family by introducing a "dilution factor." With their method, however, it is necessary to know the alloy type in advance in order to select the proper dilution factor. An unknown specimen is not amenable to analysis by this method.

For articles dealing with various phases of spectrographic work, see THE IRON AGE, *"Spectrograph Technique on the Charging Floor," Mar.* 28, 1946, *p.* 42; *"High Speed Spectrography," Part I, Aug.* 8, 1946, *p.* 50; *Part II, Aug.* 15, 1946, *p.* 61; *and "Setting Up for Spectrographic Analysis," Apr.* 17, 1947, *p.* 44.

The war years' urgency for more rapid analyses with larger numbers of specimens prompted the Douglas Aircraft Co. to investigate methods of spectrographic analysis of stainless steels as well as other alloys heretofore difficult of analysis spectrographically. A satisfactory analytical method was developed and has been in constant use for the past year. The method is unique in its use of an internal standard which is not the matrix element iron but is the sum total of all the metallic constituents of the specimen. With this internal standard the complete analysis for all metallic elements has been accomplished for such widely different members of the stainless family as types 301, 310, 316, 347, 403, and 446. Within this wide spread of chemical content, maximum deviation for individual elements were found to be as follows: Manganese, ±6.50 pct, silicon ±4.20, nickel ±3.10, chromium ±2.15, molybdenum ±7.20, columbium ±3.00, titanium ±3.15, aluminum ±5.00, and tungsten ±5.60.

Spectrographic analysis with the matrix element as the internal standard is accomplished by assuming the relationship between weight percent of any element X and spectrum line intensity of said element and the matrix element to be:

$$\text{(1)} \qquad \text{Wt Pct } x = f\left(\frac{I_x}{I_{Fe}}\right)$$

with the function f determinable by the use of standards. Assuming a similar relationship based on atomic percentages, i. e., even though the matrix element iron varies over a wide range and its line I_{Fe} value varies accordingly, the spectrum line intensity for each element in the alloy will have a functional relationship with the intensity of an iron line. In the method under discussion a value of unity is assigned to the atomic percentage of iron regardless of the actual content and all elements are related to iron by the expression:

$$\text{(2)} \qquad \frac{\text{Atomic pct } x_1}{\text{Atomic pct } Fe} = f_1\left(\frac{I_{x1}}{I_{Fe}}\right)$$

It is then assumed that the internal standard is that intensity value I_s to which each element has contributed in accordance with its relative atomic percentage content. The total relative atomic

percentage content is given by the expression:

$$(3)\quad T = 1.00\,(Fe) + f_1\left(\frac{I_{x1}}{I_{Fe}}\right) + f_2\left(\frac{I_{x2}}{I_{Fe}}\right) + f_n\left(\frac{I_{xn}}{I_{Fe}}\right)$$

and the intensity of the internal standard is given by the expression:

$$(4)\qquad I_s = \left[1.00 + \sum f_n\left(\frac{I_{xn}}{I_{Fe}}\right)\right]\frac{I_{Fe}}{I_o}$$

(with I_o equal to unity at a fixed transmission value).

The composition of each element is given by the expression:

$$(5)\qquad \text{Atomic pct } x_1 = f'_1\left(\frac{I_{x1}}{I_s}\right)C_1$$

Standards are used to evaluate the functions f_n and f'_n. The value C_n is also functional and operates as a factor to correct for the effect of the percentage of one element on the line intensity of another element[3] (where this phenomenon occurs) and also to correct for differences of gamma across the spectrum[4].

This method of calculation is suitable for either dc arc excitation with a platform-type electrode[5] or with ac spark, point-to-plane excitation. Work with both methods is still in progress in this laboratory, seeking the method of minimum variability.

Some precautions are necessary in sample preparation with the platform-arc technique. Complete removal of surface oxidation by filing is essential as is also demagnetization of filings for analysis. Loading of magnetized filings onto the platform electrode is always difficult and timeconsuming. The analytical gap is somewhat critical and should be rigidly maintained after standardization. A wide gap appears to enhance the effect of one element upon the line intensity of another. A narrow gap tends to flatten the working curves of some of the elements in the higher percentage ranges.

Although the method was developed on the basis of atomic percentages, the author has experienced no appreciable error operating this calculating system on the basis of weight percentages. Time to complete an analysis is, of course, increased by this method, but the increase in time is only 30 pct over the matrix element internal standard procedure.

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[1]Steele and Johnston, Journal Society of Chemical Industries, vol. 64, p. 278, 1945.
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[3]J. R. Churchill, Industrial and Engineering Chemistry, vol. 16, p. 653, 1944.
[4]L. Levy and O. W. Christine, Journal of the Optical Society of America, vol. 36, No. 9, p. 503, September 1946.
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Forging Anvil Resurfaced By Ingenious Setup

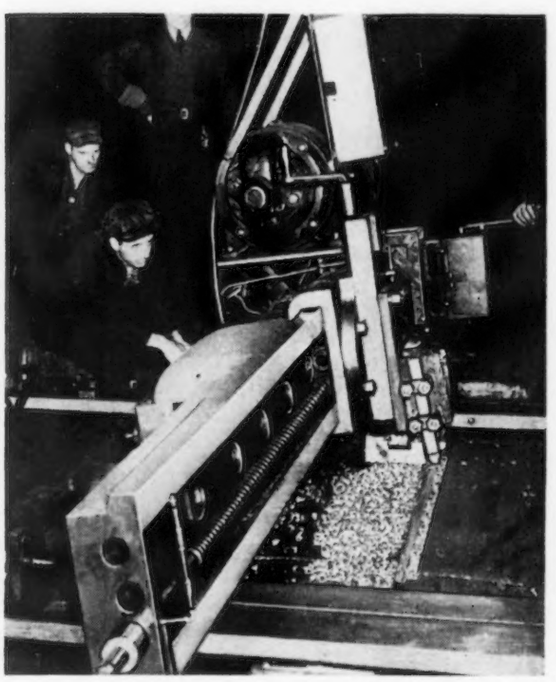
RESURFACING of a badly dented, roughened, and work hardened 69-ton steel forging anvil without removing it from the hammer was accomplished in an ingenious manner recently by its user. The anvil was used in a 12,000-lb Chambersburg hammer and had been subjected to heavy duty forging service, resulting in the work surface developing a rough, work hardened condition.

Conventional practice would have been to remove the anvil from the concrete machine base and then either scrap it or resurface it and reset both the anvil and the machine. This would have required about 3 to 4 weeks, making the hammer idle for that period.

Instead, the user rigged up a cross rail from an old planer in the hammer as shown in the accompanying photograph. A ratchet feed and a reversible motor were set up to drive the feed screw.

However, when the setup was tried, it was found that the anvil was so badly work hardened that neither high speed steel planing tools nor air-operated chisels would even start a cut in the anvil surface, the edges of the tool merely rolling over.

The problem was solved by making up four planing tools, each 1½ x 2½ x 12 in., tipped with Carboloy grade 78C. The cut was taken dry at 26 fpm and a feed of 1/32 in. The depth of cut varied from ⅛ to ⅝ in., and a total of 648 lb of steel was removed from the anvil in the resurfacing operation. Each tool was reground only once during the entire operation. The setup enabled the hammer to be put back to work several weeks earlier than expected.



RIGGING a planer cross rail into a hammer frame made it possible to resurface the work hardened and battered anvil with a minimum of downtime. Carboloy tools were used to remove a total of 648 lb of metal.

Low Cost Oxygen For Metallurgical Uses

By WALTER E. LOBO
Director, Chemical Engineering Dept., M. W. Kellogg Co., Jersey City

One of the outstanding postwar developments in steelmaking is the growing use of oxygen in the openhearth and the prospective use of oxygen in the blast furnace. The general acceptance of this new metallurgical tool by the steel industry hinges primarily upon the availability of low cost oxygen in large volume. In this article the author explains how equipment and techniques perfected largely for military use during the war promise to make available the necessary quantities of oxygen at costs substantially lower than present levels. Space requirements and estimated costs of erecting a low cost oxygen producing plant are also discussed.

A GREAT deal of interest has been aroused in recent months over the prospect of employing oxygen for industrial processes which now utilize air as the oxidation medium. Prominent attention has been given to the use of oxygen or enriched air in the synthesis of gasoline from natural gas; in the blast furnace and openhearth furnace for the manufacture of pig iron and steel; in the manufacture of producer gas and water gas; and in a number of chemical oxidation processes such as the manufacture of nitric acid from nitrogen, the manufacture of sulfuric acid by the contact process, and others.

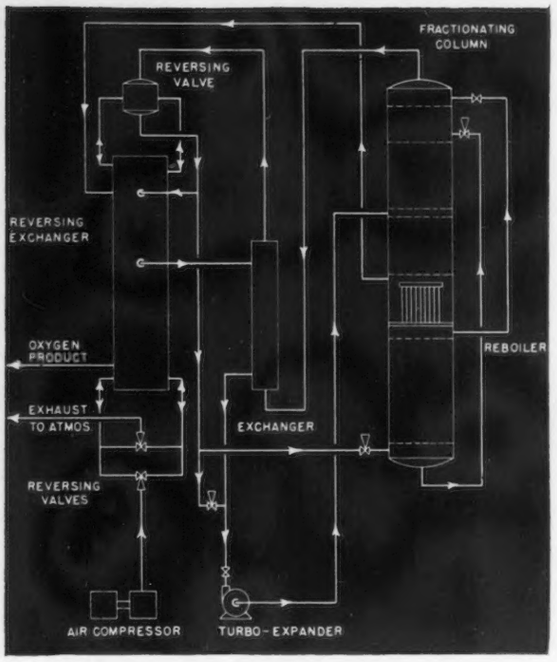
This interest has arisen because of the development during the war of a highly efficient technique for manufacturing large quantities of oxygen at low cost. The cost of oxygen has indeed been the major objection to its use by the metallurgical and chemical processing industries, who have long recognized its advantages in increasing capacity, reducing fuel consumption, and reducing labor costs and fixed charges per unit of output. The phenomenal success obtained in reduction of cost of oxygen has been largely due to the cooperative pooling of engineering knowledge by a number of universities and commercial firms.

It seems very probable that the largest single use for tonnage oxygen in the immediate future lies in the enrichment of air for the blast furnace and openhearth furnace. On a daily basis, one blast furnace alone, producing 800 tons of pig iron, could efficiently use at least 200 tons of 95 pct pure oxygen (assuming a 26 pct enrichment), and there are approximately 255 blast furnaces in this country. Although the metallurgical industry is well aware of this fact, it has hitherto been powerless to profit by it because of the high cost of oxygen.

At prices of $3.50 per ton, however, a cost figure made possible by the new low pressure oxygen process, the economic advantages of employing enriched air in blast furnaces and openhearths become too overwhelming to ignore. If the oxygen plant is constructed as an integral part of a new steel plant, a very considerable saving may possibly be made through reduction in size or entire elimination of other structures such as stoves, dust catchers, gas mains, etc. Overall savings in power consumption too would be gained throughout the processing life of the plant.

The facts on the development of the low pressure oxygen technique and the salient

Additional data on the use of oxygen in the steel industry were given in the following articles published in THE IRON AGE: *"Oxygen in Steelmaking," Nov. 28, 1946; "Use of Oxygen in the Openhearth Bath," Feb. 20, 1947; "Steelmakers Weigh Oxygen Possibilities," May 1, 1947. —Ed.*



Flow diagram for a low pressure oxygen plant.

features of the new process provide a striking narrative of modern industrial efficiency. About 1 month after Pearl Harbor, the M. W. Kellogg Co. was called upon by the NDRC to act as the central engineering organization for the development, design and testing of oxygen plants to meet the war needs of the armed services. Compact, lightweight, mobile, sturdy plants were required by both the Army and the Navy to provide oxygen at advanced bases for welding and cutting of metal, for medical purposes, for high altitude flying, for air conditioning of submarines, and for underwater propulsion engines. Kellogg was directly responsible for the design and engineering of these units and was instrumental in obtaining the aid of other companies for the development of necessary items of mechanical equipment.

After study of the many possible ways to produce oxygen, the low temperature air fractionation process was chosen as the best for the accomplishment of these aims. For the development of the process, two distinct fields were outlined. The first had to do with process information such as thermodynamic data, low-temperature insulation, heat exchangers, fractionation, packed column efficiencies, etc. The second concerned mechanical equipment—lightweight engines, air and oxygen compressors and low temperature expansion engines.

Out of this study came the now famous M-7 unit[1], the first successful low-pressure, mobile gaseous oxygen producer. This unit operated at air pressures of 100 psi in favorable contrast to the very much higher pressures of older processes. Coordination of the efforts of the many universities and industrial concerns who participated in the development, construction and operation of these units—prototypes of the huge plants being planned today—was supervised by Kellogg.

On the surface, oxygen manufacture appears exceedingly simple. All that is required is to compress air, convert it to a liquid by allowing it to expand through an orifice, and then distill the resulting liquid air to separate the oxygen (21 pct) from the nitrogen (78 pct). Unfortunately, air is not simply a mixture of oxygen and nitrogen but also contains small amounts of water vapor, carbon dioxide, hydrocarbon and rare gases. Air to be liquefied must first be purified of water and CO_2 to prevent their solidification in the equipment and eventual blocking of the flow of gases.

The history of oxygen production might almost be written upon the basis of how the baffling problem of economic removal of these impurities has been solved. In the first oxygen plants, employing the so-called Linde process, air was compressed to the high pressure of 3000 psi and the impurities removed chemically —a costly process.

About 1930, a German, Matthias Fränkl, employed a regenerator or cold accumulator for the double purpose of freezing out the impurities from the air stream and cooling the incoming air. The modified process came to be known as the Linde-Fränkl process and was undoubtedly the most advanced technique in oxygen production at the outbreak of World War II.

Its distinguishing feature was that the cold oxygen and nitrogen streams from the fractionation of liquid air were passed through a pair of regenerators, packed with crimped aluminum of high heat capacity, until the metal temperature was approximately that of the gas streams. Then the oxygen and nitrogen streams were switched to another pair of regenerators and the fresh feed air was switched through the first pair which were now so cold that the water and carbon dioxide in the entering air were precipitated out in passing through them. This innovation did not require the usual tubular heat exchangers and allowed the majority (96 pct) of the fresh feed air to be purified of water and carbon dioxide without the use of chemicals, the balance of the air (4 pct) being purified at high pressure by chemical means.

The Linde-Fränkl process succeeded in markedly reducing the cost of oxygen, but suffered from the inherent disadvantage of contaminating the pure oxygen stream, used to cool the regenerator, with residual air left in the regenerator at the end of a heating cycle. Nevertheless, although high purity oxygen could not be produced, the Linde-Fränkl process was widely adopted by oxygen manufacturers in Germany and Europe.

The next development occurred in this country during the war and resulted in better, simpler, cheaper plants, which could be built in any size to produce high or low purity oxygen as desired. The distinguishing features of these modern oxygen plants are first, the multipass reversing heat exchanger, which achieves com-

[1] *See "Oxygen by Fractionation at Low Pressures," W. E. Lobo, Chemical Industries, July* 1946.

plete purification of low pressure (90 psig) air by physical means, and second, the elimination of any high pressure air processing, thus reducing initial investment cost.

In principle, the reversing heat exchanger consisted of three coaxial tubes—one each for air, nitrogen and oxygen. Extremely cold pure oxygen and waste nitrogen from the fractionator cooled the fresh fed air by heat exchange, and at the same time froze out the carbon dioxide and water similarly to the action in the Linde-Fränkl regenerator. The two ingenious modifications, however, were that first, all of the oxygen product passed continously through a central passage in this exchanger, and thus as it never came in contact with any impurities, it could be produced in concentrations of 99.8 pct if desired; and second, every few minutes (three was the usual number) an automatic cycle timer reversed the channels in which the nitrogen and feed air flowed. Low pressure nitrogen thereupon flowed in the impurity-laden channel formerly traversed by air, scavenged the channel by re-evaporation of the impurities, and exhausted them to the atmosphere. At the same time, air flowed in the cold and clean channel formerly traversed by nitrogen. This automatic switching avoided plugging of the channels with ice and solid CO_2.

Temperature Unbalance

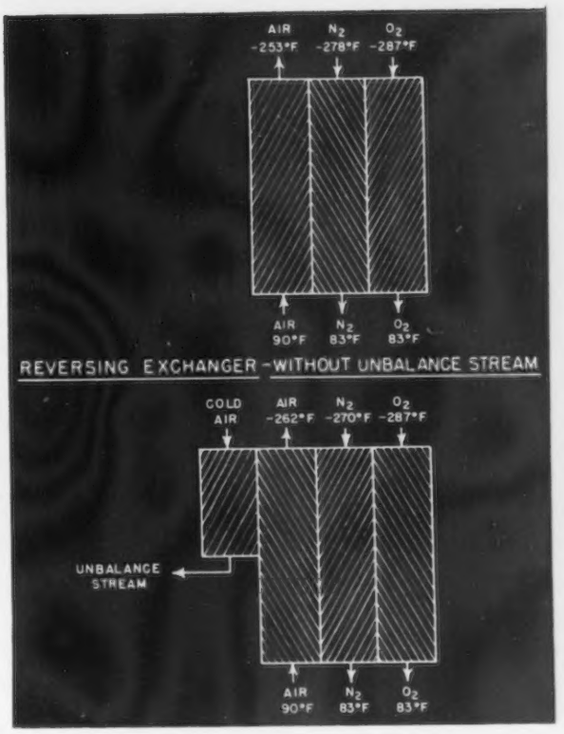
Unfortunately, the original exchanger developed could run only about 24 hr before becoming plugged with impurities. It was soon established thermodynamically[2, 3] that, for long-term operation of reversing exchangers, the nitrogen at each point in the exchanger could be no more than a few degrees colder than the fresh feed air in heat exchange with it. Only if this relationship existed could the impurities deposited in the exchanger channels from the fresh air be completely evaporated into the nitrogen stream on flow reversal. Yet the nature of the process was such that no matter how the variables were adjusted, the equilibrium temperature difference between the entering nitrogen and the exit air at the cold end of the reversing exchanger was at least 25°F. With continued operation of the exchanger under these conditions, a gradual build-up of impurities in the passages occurred, even though the nitrogen was at a much lower pressure than the air. To solve this problem, P. R. Trumpler of Kellogg conceived and worked out a unique "temperature unbalance" system[4] whereby the 25°F differential between nitrogen and air could be reduced to the permissible maximum —a range which permitted complete purification and truly continuous operation of the reversing exchanger.

[2] *"Air Purification in the Reversing Exchanger," W. E. Lobo and G. T. Skaperdas, Chemical Engineering Progress, March* 1947.

[3] *"Production of Oxygen for Industrial Purposes," W. E. Lobo, Chemical Engineering Progress, January* 1947.

[4] *Patent not yet issued.*

The Trumpler contribution was the addition of a fourth non-reversing passage to the exchanger. Via this channel, a portion of the fresh feed air which has been cooled to near



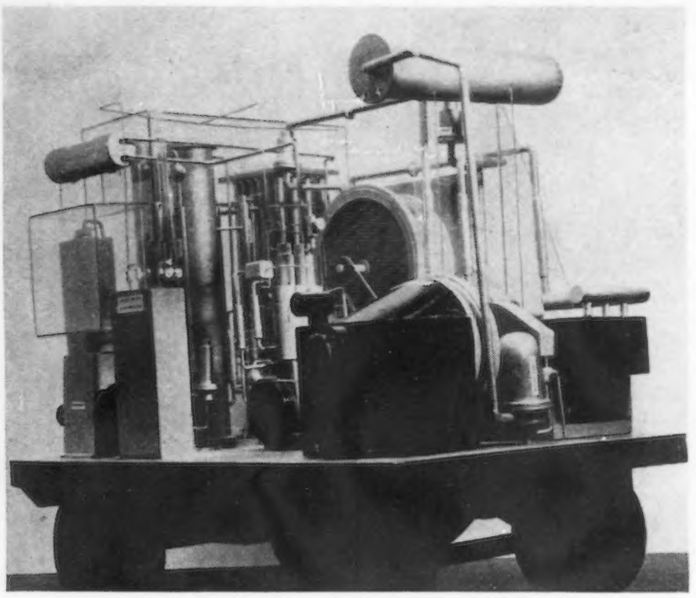
AN important factor in the perfecting of a process for producing low cost oxygen was the development of the temperature unbalance system for the exchanger. The effect of this fourth passage on the temperature differential between the air and the nitrogen is shown graphically here.

liquefaction temperature in the exchanger is utilized at the cold end of the air passage of the exchanger to supply additional cooling to the air stream and thus lower the exit air temperature further toward the nitrogen temperature. In effect, the air stream is used twice for heat exchange—once with nitrogen and once (part of it) with itself.

This unbalanced technique of artifically lowering the temperature at one end of the exchanger not only reduced the temperature differential from 25°F to, say, 8°F but the additional cooling imparted to the air stream improved the degree of purification. In Kellogg units, control of the temperature difference is effected simply and automatically by controlling the amount of unbalance air returned to the exchanger. These units also employ an improved design of reversing exchanger which is more adaptable to commercial fabrication and operation than the annular type exchanger.

No less important than the reversing heat exchanger was the development of highly efficient low-temperature expansion engines for supplying the needed refrigeration. Two types were developed—one, a high speed turbine, and the other, machines of the floating piston reciprocating type. The larger machines of both types had efficiencies in excess of 80 pct. In Kellogg units, a single expansion turbine is employed for normal operation, and the external work it produces may be absorbed by an induction-type electric regenerator. This latter is connected to the plant power line for the recovery of the electrical energy produced.

One of the principal economic advantages of today's low pressure oxygen process (90 psig)



THE first successful low pressure mobile gaseous oxygen producer was this unit developed for military use. It produced 1 ton of 99.5 pct pure oxygen per day.

is that high speed rotary or centrifugal compressors can be utilized in place of reciprocating compressors. Of great practical importance, too, is the fact that such rotary compressors operate without oil or water lubrication in the parts in contact with the compressed air and thus eliminate a likely source of air contamination. Kellogg units employ a two-stage, intercooled, turbine-driven centrifugal air compressor, which delivers clean air at 91.5 psig and 90°F to the air inlet of the reversing exchanger.

There is always the element of safety to consider in the separation of oxygen by liquid air fractionation because of the presence of small traces of acetylene and other hydrocarbons in the air, or their introduction from oils used to lubricate the compressors. If no countermeasures are taken, these hydrocarbons can accumulate in the liquid oxygen bath at the base of the fractionating column and could cause a serious explosion. Provision is therefore made to remove completely all hydrocarbon impurities from the air before it enters the fractionating tower.

Liquid Air Fractionation

In fractionation of liquid air, the Kellogg company was also able to apply its knowledge of petroleum refining techniques toward improvement of the older process. The separation into oxygen and nitrogen in modern plants is accomplished in two stages within a single fractionating tower—one stage at comparatively high pressure and the other at low pressure. First, a rough separation is made at 89 lb pressure into nitrogen and rich air (about 37 pct O_2). Then the rich air is fractionated at 9 lb pressure into oxygen of the desired purity, with liquid nitrogen from the first stage providing reflux for the second stage.

A combination condenser-reboiler section is employed in the fractionator between the two stages. In this way, nitrogen is condensed at the top of the high pressure section through heat exchange with boiling oxygen in the bottom of the low pressure section. Since the fractionating column must operate at −310°F, it is important that its volume be as small as possible, and that it be extremely well insulated to minimize heat leaking in from the outside. To satisfy this minimum space requirement, Kellogg developed a new type of high-efficiency, high-capacity, perforated tray, which was tested for the NDRC at Pennsylvania State College and in the Low-Temperature Thermodynamics Laboratory set up by the NDRC at the University of Pennsylvania. These tests indicated the possibility of 100 pct Murphree plate efficiency with only 6-in. tray spacing. Trays of this general type are now contemplated on all but the very small units.

Pure gaseous oxygen and nitrogen pass from the fractionator to the reversing exchanger in which they remove heat from the fresh air feed, and then pass out of the plant to be used as desired. Since the final oxygen stream passes through its own separate passage in the reversing exchanger and never through a pump or check valve, all possibility of contamination with air, oil, carbon dioxide or water is removed. Oxygen of any desired degree of purity within the limits of metallurgical requirements and at a few pounds pressure can be obtained by a simple adjustment of the oxygen drawoff valve, the yield varying only in proportion to the degree of purity desired. Decrease in the oxygen drawoff rate results in absolutely no upset of the unit because of the high degree of automatic control employed.

Of the rare gases present in air, argon, comprising about 0.8 pct, has often been recovered since 1911 as a byproduct of oxygen manufacture. It is currently used as the inert gas in electric light bulbs. Argon boils at a temperature intermediate between that of oxygen and nitrogen, and so, in making an oxygen of 95 pct purity, most of the argon remains in the higher boiling oxygen fraction—the split being essentially between oxygen and nitrogen. On the other hand, when making high purity oxygen (99.6 pct) the required split is between argon and oxygen, which of course requires a greater number of trays in the fractionating column.

Recently, krypton, which is present in air in the exceedingly minute proportion of one part per million, has been found to be an excellent medium for filling electric light bulbs. K-Bulbs, as they are called, give better life than argon bulbs, although they are presently much more expensive. The large size of some of the contemplated modern oxygen plants, however, may make krypton-filled electric light bulbs economically feasible, at least for specialized purposes. The Kellogg process can be modified, if desired, to produce byproduct nitrogen which could find important application as a raw material in the manufacture of nitric acid by the

oxidation method or where inert atmospheres are desirable.

A low pressure oxygen of the type described here can be operated, if necessary, by one operator per shift, and can be shut down for a few hours, overnight, or over the weekend with no adverse results. For a plant to produce 350 tons per day of gaseous oxygen having a purity of 95 pct, it would be necessary to compress about 30,800 standard cu ft of dry air per minute. Such a plant could be completely housed in a building about 60x90 ft.

The main utility requirement for a plant of this size would be 55,000 lb per hr of steam (450 psi, 700°F). The cooling water requirement would be about 240 gal per min. Electric power generated by the expansion engine of the process would, in many cases, be more than enough for the plant requirements.

Cost of Oxygen Plants

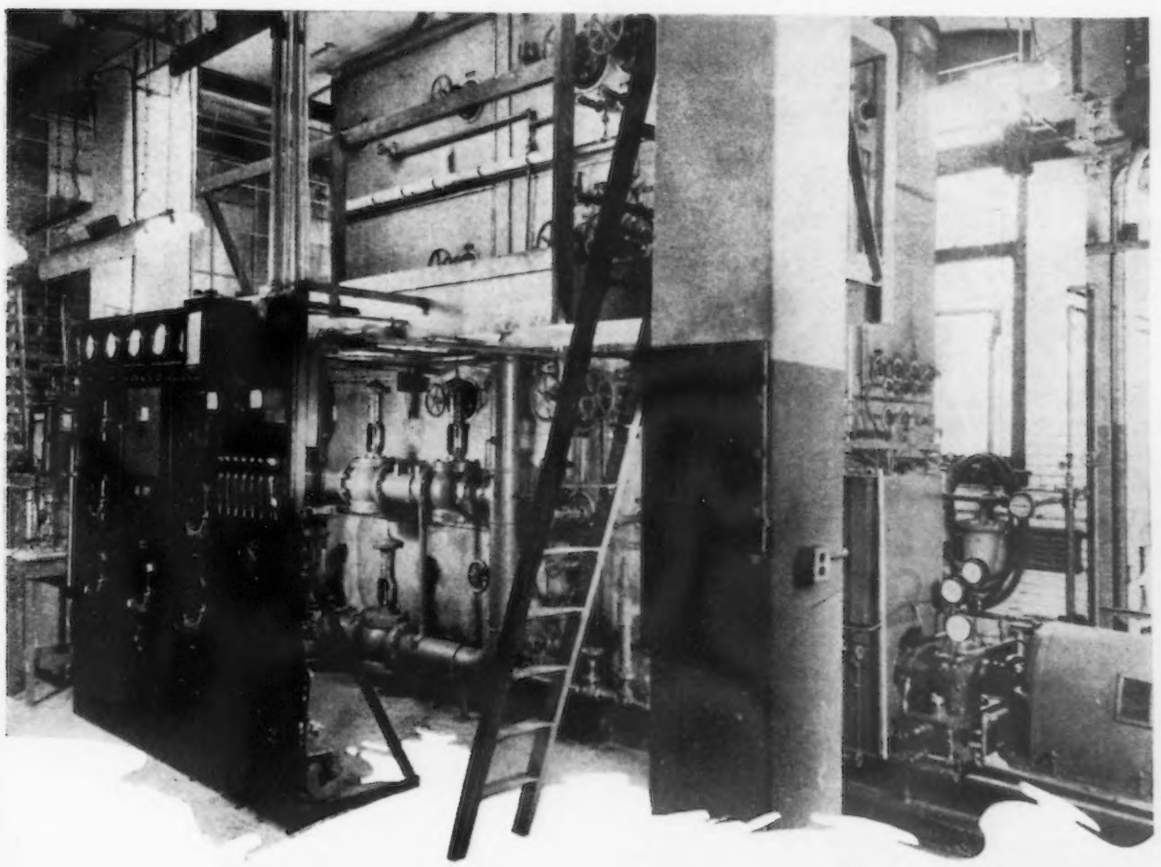
Plants esentially of the type described above have already been designed and built in three sizes, many of about 1¼ tons per day capacity, producing 99.5 pct O_2, and one liquid oxygen plant has been built equivalent to 21 tons per day of gaseous oxygen of 96 pct purity. These plants were largely for wartime uses.

However, in times like these, it is difficult to give accurate cost figures. Materials and labor are unpredictable and therefore a good figure today is inaccurate next month. Furthermore, without complete specifications, costs are meaningless. However, for orientation purposes, it might be stated that a 400 ton per day oxygen plant producing a 95 pct purity product, might be constructed for about $2 million, or $5000 per ton of capacity per day. A plant to produce 100 tons per day would cost somewhat more per ton, and one for 700 tons per day somewhat less per ton, as it is obvious that plant cost per ton of capacity is influenced greatly by the size of the unit.

As with plant costs, product costs vary with specific installations. The value of utilities varies with the location of the plant. Labor rates are different in different sections of the country, and various methods of accounting for fixed charges are used. Based on estimates for a typical installation, however, using a figure of 3 pct of plant cost for maintenance per year, 1½ pct of plant cost for taxes and insurance per year, and 10 pct depreciation per year, the total cost of producing oxygen in a 400 ton per day plant may be as little as $3.50 per ton, including all the above items plus utilities and labor charges. This is equivalent to about 15¢ per thousand cu ft.

All evidence points in the direction that oxygen of the future will be cheaper and more abundant than at any time in history because of the development of the highly efficient low pressure oxygen process. A number of industrial processes, which now employ air as a source of oxygen, are expected to be favorably influenced by the sharp drop in the cost of oxygen, and there is more than an indication that the techniques employed in this low pressure process may be profitably adapted to the purification of other common industrial gases.

LARGE liquid oxygen pilot plant installed at the University of Pennsylvania. This unit is the equivalent of a gaseous plant producing 21 tons of 96 pct purity product.



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Dramatic effects are achieved with the administration building at Cincinnati Milling Machine Co., Cincinnati, through use of large trees in a wide sweep of lawn broken by functional walks.

o o o

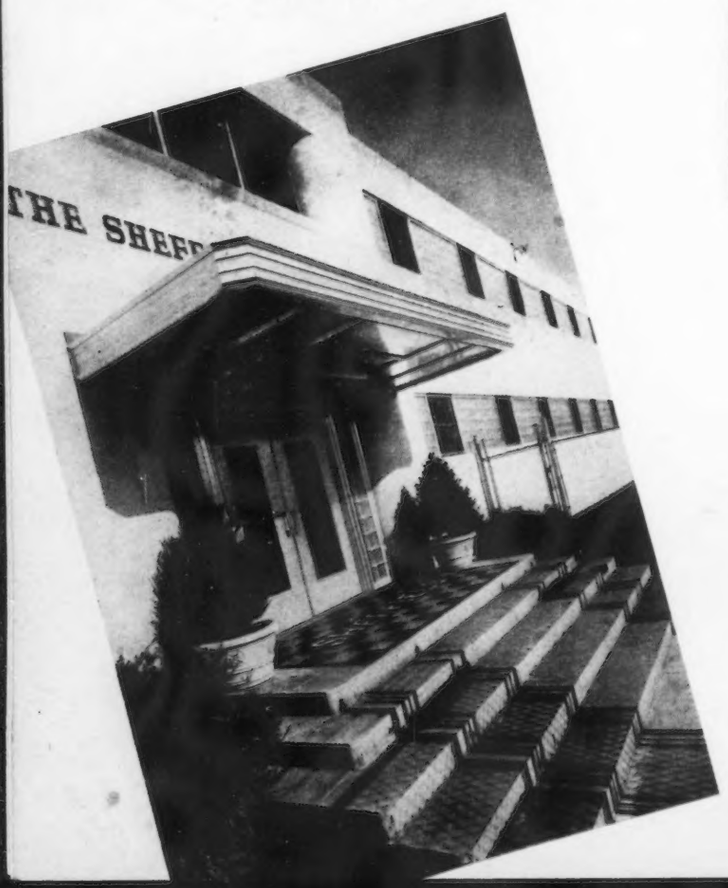
Merck & Co., Rahway, N. J., are entering a large building program which calls for modern design coupled with attractive landscape throughout to preserve the beauty already established as illustrated by this view of some laboratory buildings.

Beauty In

IMPROVED employee morale, better neighborhood relations and better customer relations are among the advantages which can be obtained by industry through a program of landscape beautification, according to William Beaudry, noted Chicago landscape architect. And to prove that industrial plants can present an attractive appearance, he cites National Cash Register, Sheffield Corp., Merck & Co., Cincinnati Milling Machine Co., and others. The accompanying photographs illustrate the beauty that can be lent to industry through effective landscaping.

The experience of plants which have undertaken landscaping programs is summed up by G. E. Warren, vice-president, Southwestern Portland Cement Co., who emphasizes that "grounds and buildings are as important as the machinery. They are best kept in good repair by proper landscaping. Attractive appearance through well-kept lawns and shrubbery aids in keeping the plant clean and making surroundings pleasant for employees, customers and neighbors."

W. S. Johnson, president, Friden Calculating Machine Co., Inc., has stated, "We believe that abundant shrubs, cut flowers and a spacious lawn are not only good advertising, but they materially help in maintaining a high appreciation on the part of all our employees of the necessity for orderliness and cleanliness inside the plant."



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The entrance to the general offices of the Sheffield Corp., Dayton, presents this pleasing appearance. The plant itself is surrounded by young shade trees planted when the building was erected.

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The grounds of Connecticut Mutual Life Insurance Co. offices at Hartford strike a note of serene dignity.

o o o

Industry

By Edmund Mottershead, *based on an interview with William Beaudry, prominent Chicago landscape architect.*

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In many communities, plants which have attractive grounds become part of the regular tours taken by visitors to the city. The fact that employees work better under pleasant surroundings is well enough known to make customers expect a better product, better service, and better dealings simply from the appearance of the plant.

Hundreds of industrial establishments have found it possible to beautify even small areas of land, parkways and entrances to buildings, alleys and courts within buildings. Those having sufficient ground areas find no trouble having successful lawns.

According to Mr. Beaudry, raising a fine lawn or beautiful trees and shrubs is not a matter of chance. Careful soil analysis, the use of a good natural compost of manure, soil, moss and other materials, selection of the right varieties of grass and shrubs for the locality and climate, coupled with systematic care simplified by scientific supervision, will make possible an attractive landscape for any industry.

Entrance to the plant of the National Cash Register Co., Dayton. Maintaining attractive surroundings such as this is an established policy of NCR.

o o o

Southwestern Portland Cement Co., Osborn, Ohio, has accomplished an outstanding job of beautifying plant normally associated with dust and dirt.

o o o

Metal Distribution From A

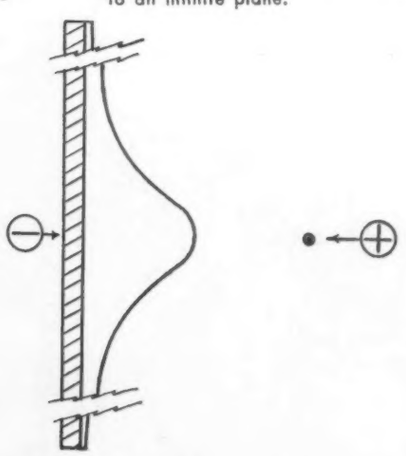
IT is almost impossible to attain an ideal distribution of metal on the surface of a plated article. The ideally distributed metallic coating would be one that would show failure in service from the total of all causes at the same time. The distribution would be such that all areas would be protected against corrosion, and exposed or projecting areas additionally protected against wear. The areas exposed to wear are usually the corners and edges. These areas normally receive more metal in the plating process so that in some cases all that is required is to plate a sufficient amount of metal in the recesses without depositing excessive metal on the exposed areas, or on significant surfaces. However, this is not always a simple problem. On some articles, such as silver teaspoons, an extra amount of metal is deposited, in a separate plating step, on the surface exposed to wear.

Metal distribution is dependent on the geometry of the plating arrangement in the bath and on the plating characteristics of the bath.

Kasper[1] developed mathematical equations for current distribution over various shapes. For a given shape and a knowledge of polarization, the current distribution can be calculated from the Kasper equations. If the cathode efficiency is also known, then the metal distribution can be calculated from the current distribution data.

The equations, however, are complex; they were only developed for certain shapes, and data are required on the change in cathode polarization and cathode efficiency with change in current density. Nevertheless, the fundamental principles behind these equations are well worth consideration.

FIG. 1—Current distribution from a line to an infinite plane.



It is best to consider current distribution or 100 pct cathode efficiency, at zero polarization in order to see how the current may be distributed over a shape. It may then be seen how cathode polarization and cathode efficiency cause the metal distribution to vary from the theoretical current distribution.

If plating takes place from a line anode to an infinite plane, the plate thickness will vary inversely as the square of the distance from the line anode. The plate distribution will appear as in fig. 1.

This tendency of the metal to plate heavy at the point nearest the anode necessitates the use of a proper number and a proper spacing of the anodes in order to overcome this condition. As long as the cathode is flat, this problem in geometry is not complex, but unfortunately the plated piece almost always has edges and corners that may require special consideration. Flat surfaces, edges and corners tend to receive the plate as the first, second and third powers. Because of this tendency the edges and corners present a problem other than that of the position of the anodes.

The problem is; they are natural high current density areas and that in addition to receiving excessive plate, high current density troubles of the particular bath may take place. These troubles may consist of treeing, rough plating or a burnt deposit. The problem may be solved by change in design of the piece to eliminate sharp corners and edges. It may also be solved by placing a nonconductor between the anode and the edge in order to shadow it from the current.

The problem, however, depends mostly on the particular plating bath so that it is best to consider the application for a particular bath. For instance, a deposit from a chromic acid bath will approximate the theoretical current distribution because the metal thickness varies almost as the inverse square. For this reason the geometry of an arrangement for plating chromium must be well planned. On the other hand, anode positioning and the use of robbers or shadows are not very important in plating from an alkaline tin bath. Because of the characteristics of the chromic acid bath and the alkaline tin bath they are best known as baths of low and high throwing power respectively. Most of the other baths are not extreme in this respect so that it is well to consider general plating bath characteristics in order to have a foundation for a specific plating problem.

om A Plating Bath

By J. B. MOHLER AND H. J. SEDUSKY
Research Chemists,
Cleveland Graphite Bronze Co.,
Cleveland

Distribution of metal from a plating bath is a subject that fully deserves the increasing attention being devoted to it. In this article, the authors examine some of the basic aspects of metal distribution and explain some of the factors affecting current distribution, throwing and covering power, polarization, plating range and current density, particularly as they influence plating quality. A table of plating ranges for common baths is also given.

A bath is often described as having good or poor throwing power. This characteristic is used in a qualitative sense. The alkaline baths are generally good in throwing power as compared to the acid baths. Throwing power in this sense is the ability of the bath to distribute the metal to all parts of a complicated shape and particularly to plate in recesses.

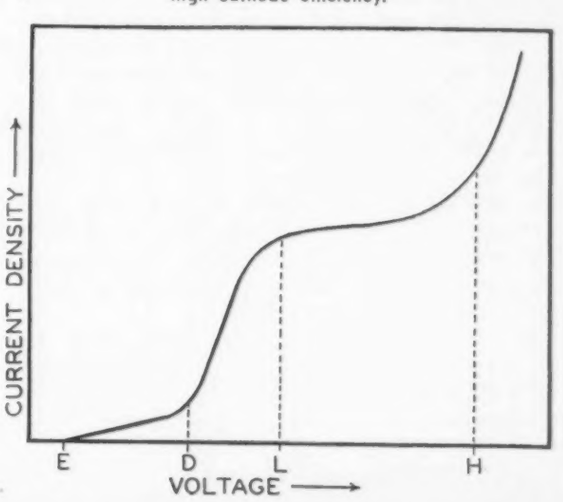
Throwing power may be measured and expressed as a quantity by the method of Haring and Blum.[2] The equipment used in this method consists of a long narrow cell containing one anode and two cathodes. The anode to cathode distance is different to each cathode and the throwing power is measured by the amount of metal deposited on the near cathode as compared to that on the far cathode. There is some doubt as to the value of such measurements since a complete study should include measurements at various current densities and measurement of cathode polarization. For a particular plating problem, it would be better to plate the actual piece or a replica and to measure the plate thickness at important points. By experimentation, an arrangement might then be found that would produce more favorable distribution.

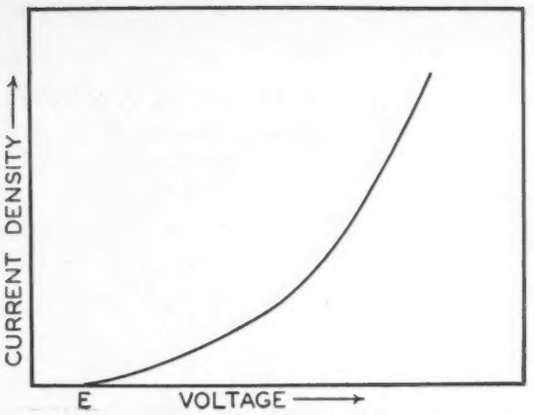
[1] *C. Kasper, Trans. Electrochem. Soc. 77, 353 (1940).*
[2] *Haring and Blum, Trans. Electrochem. Soc. 44, 313 (1923).*

If an artice contains a deep recess, it may be difficult to deposit metal in the bottom of this recess. If such an article can be covered completely, the bath is said to have good covering power. Covering power may be measured by setting up a standard test, and it may be expressed as the minimum current density at which plating takes place if the test is properly calibrated. It is desirable to know the necessary minimum current for plating to take place as well as the current density at this minimum current. From these data, the quantity of metal that may be obtained in the bottom of a recess may be determined. For a minimum current obtained in an area difficult to reach, some much greater quantity of current will be obtained in raised areas. The quantity here may be prohibitive, or the bath may not be capable of plating satisfactorily at the highest and lowest current densities obtained.

Polarization is a reverse potential that develops during plating. It is a counterforce that is set up at the electrodes as a result of the electrode reactions and tends to reduce the flow of current. It can be shown to exist experimentally by suddenly cutting the current, in which case a current will flow in the opposite direction for a short period of time. Excessive polarization can cause trouble at either the anode or the cathode by formation of chemical films, but normally polarization is a natural aid to good metal distribution. Polarization increases with current density, and since this is so, it tends to hold the current back more in the high current density

FIG. 2—Current-voltage curve for a plating bath of high cathode efficiency.





IG. 3—Current-voltage curve for a plating bath of low cathode efficiency.

areas and thus reduce overplating in such areas.

A current-voltage curve for electrodeposition from a bath that will deposit a metal and hydrogen is shown in fig. 2. The voltage for this curve is only the voltage from the cathode to a point in the solution very near to the cathode.

At zero current density there is an equilibrium voltage known as the electrode potential. As current is applied, the voltage increases gradually to the point *D* (fig. 2). Along *ED* no plating takes place even though current flows. Thus in very low current density areas one must expect to have trouble with coverage. Point *D* is known as the decomposition potential or the point at which the electrode reaction begins. Beyond this point plating takes place at an increasing rate as the current is increased and the increase in voltage is at a slower rate. At the point *L* the limiting current density is reached. At this point a second electrode reaction takes place. In plating baths this point usually shows up as the point at which hydrogen is evolved. For most acid baths the plate becomes rough, burnt or spongy at this point. Thus, the plating range is between the points *D* and *L*. If plating is continued beyond this point, the point *H* will be reached where hydrogen will be evolved at a high rate and any further increase in current density will not increase the voltage appreciably because the decomposition potential for hydrogen has been greatly exceeded.

Fig. 2 is an ideal curve that is not always obtained. In many baths, such as chromic acid, rochelle copper or alkaline tin, hydrogen is evolved during plating and over all or most of the plating range. This merely means that the cathode efficiency is less than 100 pct. A current voltage curve for a bath plating metal and hydrogen at the same time may appear as in fig. 3. The change in cathode efficiency with change in current density may appear as indicated in fig. 4.

The electrode reactions for the deposition of metal and hydrogen overlap in fig. 3 and no sharp breaks are found in the curve.

An alkaline tin bath behaves as in fig. 4. Up to a current density of *X* the cathode efficiency is essentially 100 pct and in a plating range below this density the bath will distribute metal as the current is distributed. Beyond point *X* excess current will plate some tin and some hydrogen so that high current density areas will not become overplated. An alkaline tin bath, a rochelle copper bath or a silver strike, produces very good metal distribution because of the drop in cathode efficiency with increase in current density. The chromic acid bath does not behave in this manner because the cathode efficiency starts low and increases with increase in current density, hydrogen being evolved over the whole range.

A knowledge of the qualitative laws of metal distribution is not sufficient for the solution of a plating problem. The behavior of the bath must be known; for the metal may distribute to all areas of a piece but the plating will only be satisfactory within a range of current densities.

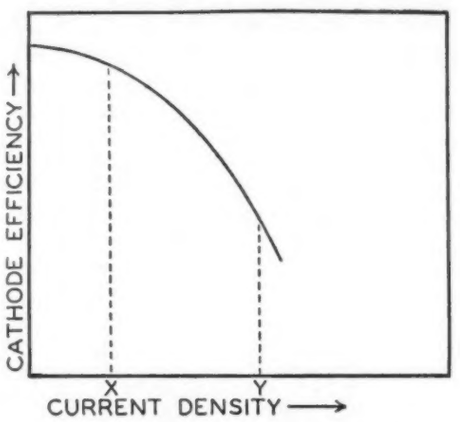


FIG. 4—Drop in cathode efficiency with increase in current density.

Every well controlled plating bath is operated within specified limits. The concentration of chemicals is kept within limits. The anode and cathode current densities are kept within limits; and the impurities entering the bath are kept below undesirable concentrations. The temperature and even the rate of cathode movement may be controlled. When all important variables are controlled, then the bath will plate satisfactorily over a range of current densities. Below a certain current density the deposit will not be satisfactory. Above some other, much higher current density, the deposit will not be satisfactory. Between these two minimum and maximum current densities, the deposit will be satisfactory and this satisfactory range is known as the plating range. The cause for a poor deposit below the plating range is different than the cause for a poor deposit above the plating range. At very low current densities the deposit may be spotty or it may refuse to cover at all. At very high current densities the deposit is often rough, treed or nodular.

Plating range, then, is a fundamental characteristic of a plating bath. It varies from bath to bath. In an alkaline tin bath it is very wide, almost infinite, while in some baths such as a simple acid nickel bath it is quite narrow. The plating range of a bath can be directly measured and many baths today are controlled to a great extent by a plating range test. Such a physical test can be made in many ways, the most popular of which is the Hull test. This test uses an in-

clined cathode to give a different current density at every point along the cathode. A typical electrode arrangement of a Hull cell is shown in fig. 5.

However, it is well to first consider exactly how the plating range limits the usefulness of a bath; and, secondly, the plating bath characteristics that limit plating range.

Consider the plating of a reflector with a bath of limited plating range. Fig. 6 is a diagram of such a condition.

At the edge of the reflector the deposit is very heavy and it may even be burned in this high current density area. In the deep recess of the reflector there is no deposit. This condition may be corrected by the use of anode positioning and shadowing shown in fig. 7.

This is largely a matter of experiment to determine the size and position of the anodes and shadows to obtain the desired distribution of the deposit. This may be an answer to a problem, but it is not always economical since special shaped anodes, shadows, and special racking procedures are costly.

Plating Range of Various Baths

Table I gives the plating range for the common plating baths according to the most widely accepted formulations.[3]

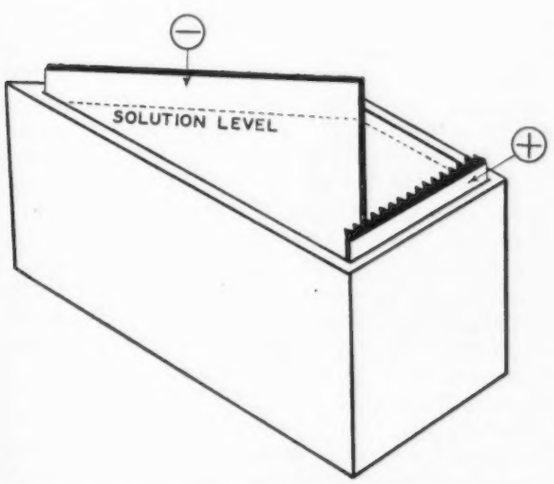


FIG. 5—Typical electrode arrangement in a Hull cell.

For a particular application a wide plating range may not be required. If a wide range is required and a particular metal is specified, then there may be a choice of baths such as an alkaline or an acid bath to deposit tin. If a particular bath is required, then one is limited to the range of that bath and it may be necessary to carefully control the bath by analysis and by plating tests.

Current density is of primary importance since the amount of metal deposited at a given point can only be known if the current density is known at that point. At a constant and known current

(CONCLUDED ON PAGE 144)

[3] *Modern Electroplating, the Electrochemical Society, N. Y., Plating and Finishing Guidebook, Metal Industry Publishing Co., N. Y.*

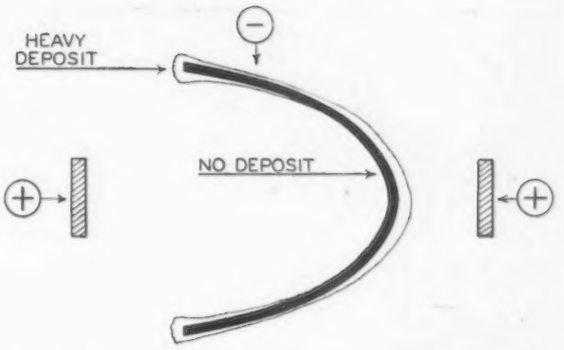


FIG. 6—Metal distribution on a reflector which will give uneven thicknesses in various sections.

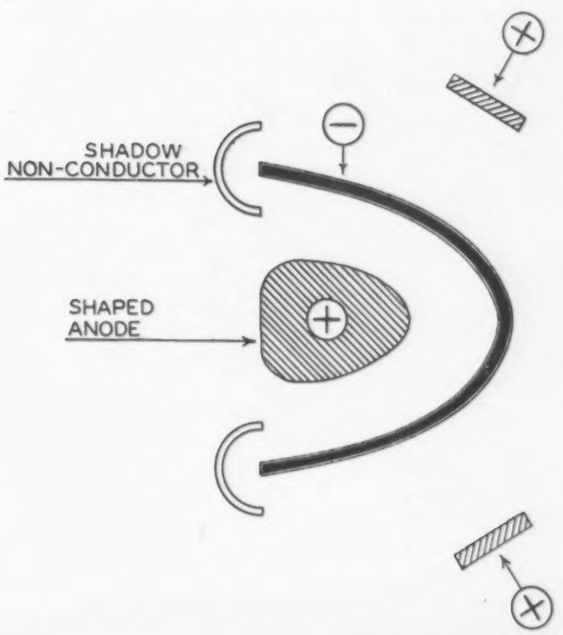
TABLE I

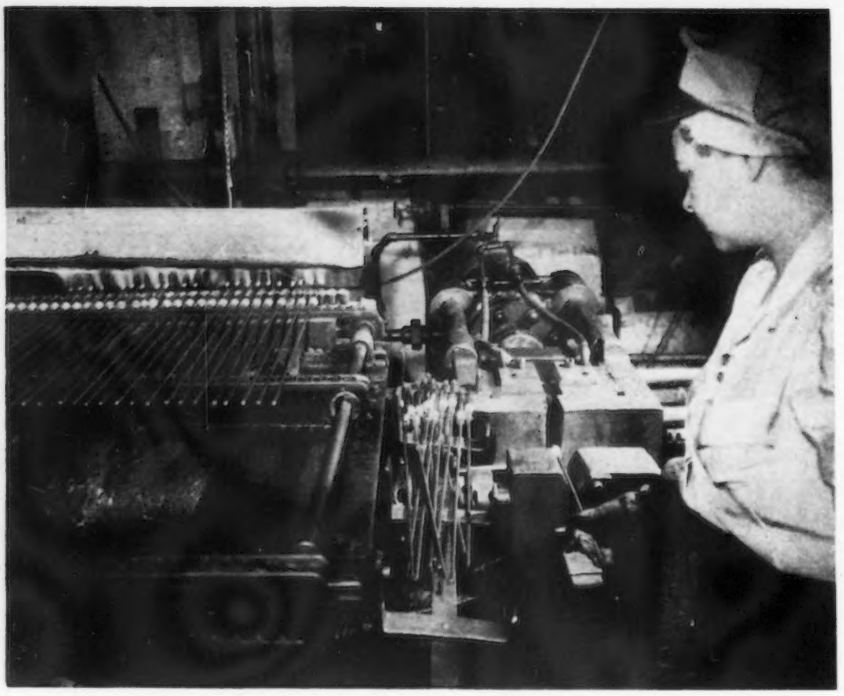
Plating Range and Current Density Range for Various Plating Baths

BATH	Recommended Operating Current Density Range, amp per sq ft	Plating Range,* amp per sq ft
Brass	3-5	1-60
Cadmium (cyanide)	15-45	1-90
Chromium	50-450	50-500
Copper (rochelle)	20-60	1-60
Copper (high efficiency)	10-100	1-100
Lead (acid)	10-80	1-130
Nickel (bright)	15-50	1-130
Silver	5-15	1-15
Tin (acid)	5-50	1-40
Tin (alkaline)	6-60	1-130
Zinc (cyanide)	5-50	1-130

*The plating ranges given can be expected of baths in good condition, operated under normal plating conditions. Changes in bath composition, temperature, cathode agitation, etc., will have an appreciable effect on the plating range. The plating ranges were estimated from Hull cell data. The lower limits were not accurately determined but estimated to be a current density of about 1 in most cases.

FIG. 7—Corrected metal distribution on a reflector using proper anode positions and shadowing.





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BARS are inserted into dies which head the end, form a flange and produce a flat in a single operation requiring about 2 sec. Arrangement of conveyer belt and gas heating equipment may be seen.

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Hot-Heading And Cold-Forming Bars In Single Operation

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A PRODUCTION setup, which enables an operator to simultaneously produce a circular flange, a square head and a 1-in. flat on ¼-in. round spreader bars, at the rate of 30 pieces a min, has been developed by the J. Edward Ogden Co., New York, for forming reinforcing bars used in the construction of concrete walls and foundations. In the development of this equipment consideration had to be made for producing the flat about 10 in. in from the bar end as well as for the upsetting operation required to produce a square head and a flange separated from each other by the neck of the bar diameter. The equipment, which performs these operations on one end of the bar at a time, is shown in the accompanying illustration.

In operation, bars sheared to the required length, usually 30 in., are placed on a chain conveyer and a set of washers with an axially-drilled wooden cone is slipped over one end. These parts are positioned between the end to be upset and the flat. As the bars are carried toward the header, the ends pass through a propane gas flame which heats about 2 in. of the bar end to a yellow-red heat. The rod is then picked up by the header operator who slips the heated end into dies, in a Watson-Stillman machine, which do the heading and flattening simultaneously. One ram closes the gripping dies for hot-heading and the second ram advances the header punch which performs the upsetting operation, thus forming both the circular flange and the square head. When the gripper dies close, a die actuated by a third ram performs the flattening operation. All rams are actuated by a single pedal and the dies open automatically to permit hand removal of the rod. These dies are supported in a C-shape frame set horizontally so that the ram is parallel with that for the gripper dies. Rods are run through the conveyer again and the same process is repeated on the opposite ends.

In construction work, these rods are applied perpendicular to the sheathing between which the concrete is poured and they must withstand pull up to 3000 lb each. Large ends of the cones placed on the bars prior to the forming operations space the sheathing properly. Malleable iron wedges, seating on walers under the rod flanges, are used to tighten the forms and take the pull. The wedges are knocked out and the sheathing removed when the concrete has set and a quarter-turn of the square head breaks the bar next to the flat holding the spacing washer, which leaves the central part of the rod embedded in the concrete. The cone is then pulled and the hole filled with concrete. Use of these bars for reinforcing concrete is reported by J. Edward Ogden engineers to cut labor and time required with the use of wooden spacers and carpenters' methods of holding forms.

How to Use Carbide Cutters for Milling

. . . A Practical Conversion Problem

Continuing the discussion of the problems of converting a large motor frame to carbide milling, the factors involved in milling the clearance under the axle pads, cutting narrow slots and facing window openings are investigated in this second section. Production figures are given to show that by converting present equipment to carbide, output can be tripled, but it is also pointed out that by the use of better equipment production could be increased eight times.

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By H. A. FROMMELT
Consulting Engineer,
Chicago

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THIS continuation of the discussion of the carbide milling of a motor frame centers around the interesting metal removal jobs referred to as the clearances on or under the axle pads and the window frames. The former can be clearly recognized by an inspection of fig. 82 (Part 18, July 10, 1947). At the top is shown the slot; the steps adjacent to the slot are known as the clearances. The clearance on the bottom axle pad is also visible though not so clearly. It too consists of a step that is used for some specified clearance. The windows are shown in figs. 84 and 85. The operation on the latter consists in the milling of the narrow strip of cast metal around the opening that serves as the mating surface for the door.

Not one of these operations is unusual or out of the ordinary. They are all simple, plain face or peripheral milling operations, excepting for the slotting job performed on the top axle pad section. This latter milling job illustrates an interesting carbide cutter and shows the effectiveness of its application. Yet all of these operations taken together add up to a typical production such as American mass production industry is faced with every day.

The business of milling the so-called reliefs is primarily the job of getting metal off quickly without much concern about the surface condition and the accuracy. None of these tolerances are closer than 0.010 in. Hence the designation of a horizontal machine, and its use, as shown here, is the equivalent of using a high strung, harness racer on a stoneboat. The operation should be performed by a 6 or 7-in. spindle with a fixture so designed that the closest possible relationship can be established between the job and the cutter. The extension that is necessary for the milling of these reliefs can be appreciated from fig. 82 (Part 18, July 10, 1947) in which the 45° chamfer or face and one of the reliefs is being milled with high speed steel cutters.

This operation is converted to carbide, but using the same inadequate equipment, with the application of a peripheral milling cutter, 9 in. diam with 18 teeth. The diameter is run up to 9 in. solely as a concession to the machine's lack of spindle speed. It will be recalled that this is limited to 150 arbitrarily in spite of a top speed of 200. And this restriction is justified in view of the machine's condition. The sfpm rate is down to 353 when it should be as high as 600 on the low side and 900 on the high side. (The boiler plate sfpm rating, it will be recalled, is somewhere between 600 and 900.) If a 0.010-in. chip load is tentatively selected for this operation of milling the step or relief, then with 18 teeth and an rpm of 150 the feed rate will be 27 ipm. The

metal removal rate corresponding to this ipm is 1.5 x 0.750 x 27, or approx 30 cu in. per min. It does not require much experience to condemn this rate as excessive for the setup, that is, the bar extension, the nature of the machine, etc. The metal removal rate will necessarily be restricted to one half that amount, or 15, and in this specification the ipm becomes 13. The chip load is now 0.005 in. and this is near, if not actually, on the danger mark for cutter life. Yet these are the compromises that must be made when the fundamentals of good milling practice are violated, such as the improper selection or designation of equipment. Is the conversion of this operation to carbide worth while and justified? Let the record answer: The cutting time for each of these reliefs with carbide is approx 5 min; for the previous method it was 18 min. The reconditioning time and cost for cutters is reduced to one third using carbide mills. These, however, are only small advantages in the face of what could be done with good fundamentals.

The slotting of the relief face, the end of which slot can be seen clearly in fig. 82 (Part 18, July 10, 1947) calls for a cutter design somewhat out of the ordinary. The slot is 0.500-in. wide and hence the body cannot be more than 0.475 in. It must be 8 in. in diam in order to design into it sufficient blades to have more than one in the cut at all times. Only one tooth in contact with this setup of cutter and machine and spindle extension would be fatal to good results. The effect on the bar, the decrease in cutter life and higher machine maintenance would condemn carbide.

The cutter designed for this slotting job is shown in fig. 86. The diameter, as stated previously, is 8 in. and it has 24 teeth. The cutting angles are zero axial rake and 5° radial rake. These angles are justified on the basis of the soft, low carbon steel to be slotted and experience with similar operations. The clearance angles are also worthy of note: The 5° on the OD or periphery is unusual and the 2° both radially and axially on the sides of the blades deviates from previous practice. Yet these relatively large clearance angles do not result in lowered life.

Important also is the grinding of a chip breaker into the periphery, the depth of the chip thickness and in the form of a nick or V-notch made with a diamond wheel peripheral edge. This so-called breaker causes two chips to be formed instead of one. And herein lies a tremendous advantage; one chip, the width of the slot tends to choke up the slot, resulting in severe abrasion and friction. These latter are carbide's worst enemies. A chip breaker should be considered a must for all narrow slotting jobs; the wider slots should be milled with two assembled slotting cutters that, in turn, form two chips and thus obviate this difficulty.

The problem of metal removal in or from a slot calls for good judgment and requires much background experience. It is better to approach this job from the standpoint of a reasonable chip load per tooth leading up to the feed rate; if this seems high, start over with a lower tooth loading and try the new feed rate. It is best with a questionable assembly of machine tool, bar and workpiece, to commence with a chip load of not more than 0.007 in. This is still on the side of fair practice. At this load per tooth the ipm is 150 x 12 x 0.007, or 12.6 ipm. This is reasonable, as experience confirms, and is still three to four times faster than the older method. This slotting operation should be executed at 25 ipm and can be so performed if the setup is right.

The cutter life for slotting is good in spite of the disadvantages of the low chip load, and the bad entrance angle. At least the cutter life is better than with other cutting materials and this is about all that can be hoped for. In fact the slots on eight of these frames can be milled before changing cutters, whereas it was necessary to change high speed slotting mills twice in an

FIG. 84—View of one of the windows or openings around which a narrow strip must be milled to mate with a cover plate.

8-hr period, and then only three frames were milled. With the carbide eight are so completed. The entrance angle in a slotting operation of this nature is a decided disadvantage, but nothing can be done about it. If the nature of the entrance angle is understood in slotting, too much cutter life will not be demanded. The relationship between the life in in facing and slotting is in the neighborhood of 10 to 1. This will and does vary depending on the materials, the nature of the entrance angle, etc.

The entrance angle effect is that of increasing the angle at the instant of entrance to a decided positive when the slotting is a U-shaped slot operation instead of a through slot. In other words when the slotting is peripheral in action then the entrance angle is a decided and disadvantageous positive at the instant of entrance. Once the blade or tip is in the cut, the actual angle of contact between the work and the cutting element is that which is designed into the blade. But at the instant of entrance that angle is entirely different; and in carbide, with a pronounced positive,

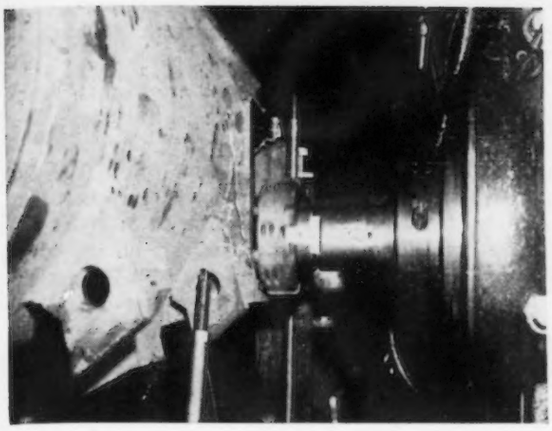


FIG. 85—A second window frame is located in a different plane from that in fig. 84. Two other windows, not visible in the illustration, must also be milled.

the effect on the tips is noticeable. When the slotting operation can be effected with the center line of the cutter in line with the workpiece, see fig. 87, then the entrance angle is the radial rake angle of the design. Under these conditions the life can and will be decidedly in the higher brackets.

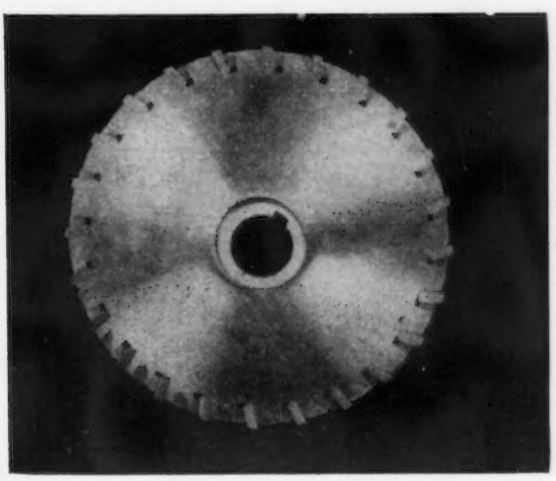
Milling Window Frames

The operation of milling the window frames as it will be referred to in this discussion is visible in figs. 84 and 85. These show the milling of two different frames. Actually this end of the workpiece has four frames and hence there are four distinct jobs to be done on this end of the motor frame.

The first important consideration is the nature of the material. This, as always, plays an important part in the specification of such a prime operating characteristic as the specification of the sfpm rate. Since this end of the motor frame is cast steel, the rate is fixed immediately as 300 sfpm.

This injects a new difficulty into the planning of this job—the change of cutters on this single

FIG. 86—Slotting cutter for narrow slots is 8-in. diam and has 24 staggered teeth equipped with chip breakers.



spindle machine from those having a grade of carbide capable of withstanding the wearing action of boiler plate, to an entirely different material that will withstand the onslaught of cast steel. These materials are radically different in their actions and hence require different cutting elements. A compromise is made, therefore, and a carbide grade is specified, with the recommendation of the manufacturer, that will satisfy both operations. The surface foot rate, however, is kept in the lower bracket as indicated by the choice of 300 sfpm. The 9-in. step mill, set as a face mill, is now applied to this job of removing the metal from the window frames. The 9-in. cutter is used, again as a compromise, but with the thought that the time saved in eliminating a change of cutters will outweigh the disadvantages of using this size cutter.

A 12-in. diam mill should be used there, and used as a face mill. The present equipment does not have either the power or the rigidity to accommodate a 12-in. mill to this job. The 9-in. cutter, run at 150 rpm, yields a surface foot rate too high; hence the spindle speed is restricted to 120. The eight blades are set in the same cutting circle and plane, and hence with a chip load of

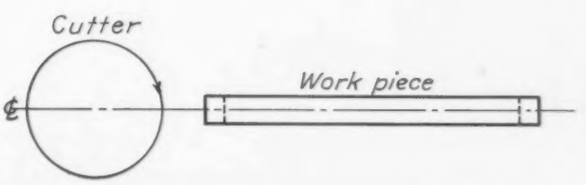


FIG. 87—If the work can be arranged so that the centerline of the cutter is in line with the centerline of the slot, the entrance angle will be the same as the radial rake angle and tool life will be increased.

0.010 in., the feed per revolution is 0.080 in. and the feed per minute is approx 10 in. This is just about all that this setup, particularly the extended bar, will take.

Under the conditions imposed in the production personnel it is astounding that three times as many frames can be milled as with the previous technique. But these results may be dangerous in their effects if taken too seriously and over a long period of time.

The approach that should always be made, particularly when a production operation of considerable duration is under study is this: This motor frame is a standing order; hence the best possible methods, equipment and techniques are justifiably studied to determine the maximum efficiency or the greatest productivity per manhour. Any other approach is damaging to unit costs and manhour productivity.

The operation on this motor frame should be performed on a planer-type machine, with a 7 or 8-in. spindle, of the cross-rail type or one which has available at least two horizontal spindles. Each spindle must be equipped with 50 hp direct

Previous articles in this series covering carbide milling were as follows:

Part No.	*Subject*	*Issue Date*
1.	Fundamentals of carbide milling.	Feb. 13, 1947
2.	Low carbon steel and wrought iron.	Feb. 20, 1947
3.	Straight carbon and cast steel.	Feb. 27, 1947
4.	Heat-treated steels.	Mar. 6, 1947
5.	Armor plate, heat-treated alloy steel, stress proof steel, die plates.	Mar. 13, 1947
6.	Stainless steels.	Mar. 20, 1947
7.	Semisteel, Ni-Resist, alloy cast iron.	Mar. 27, 1947
8.	Factors governing cutter life, selecting feed rates.	Apr. 10, 1947
9.	Regulating life between grinds, cutter design.	Apr. 17, 1947
10.	Factors involved in good practice.	Apr. 24, 1947
11.	Tool grinding, reconditioning and blade setting.	May 8, 1947
12.	Converting to carbide milling.	May 15, 1947
13.	Planning carbide milling operations.	May 22, 1947
14.	Analyzing the workpiece, establishing feed rates.	June 5, 1947
15.	Rating carbide milling jobs.	June 12, 1947
16.	Rating carbide milling jobs (continued), selecting cutter size.	June 19, 1947
17.	Straddle milling v. face milling	July 3, 1947
18.	A practical conversion problem.	July 10, 1947

connected motors, with spindle speeds permitting at least 1000 sfpm and feed rates as high as 75 ipm.

With these machine characteristics to work with, the following results can be expected: The axle pads can be milled at 150 cu in. per min rate, which corresponds to 75 in. feed rate. And the type of equipment will warrant that speed. The slot, referred to before, can now be milled at 25 to 30 ipm. The clearances can all be milled at 75-in. feed rate and the windows at 40 ipm.

If one spindle is equipped to mill the boiler plate end of the component and the other the cast steel, then no time will be lost by changing cutters. There is some question and justification for reasonable argument concerning the use of a head on the cross rail. But since such a head must be equipped with a 50 hp motor, and since the rate of metal removal it will be called on to perform will be in the higher brackets, it is doubtful whether the results will be as successful as using a second horizontal head. The greater rigidity would seem to lie in the latter design.

The final result of this kind of carbide milling, and it has been tried experimentally on this motor frame, is the production of one frame complete each hr. With the previous technique and high speed steel cutters the time was one each 8-hr period. With carbide on the present equipment this has been stepped up to three.

Part 20, the concluding part of this series on carbide milling, will appear in the next issue—Ed.

Electric Impact Tool Features Versatility

INCORPORATING a spring-actuated cam mechanism which converts motor power into a series of rotary impacts and prevents overloading or stalling, a new 6½-lb ¼-hp portable electric power tool, illustrated in the accompanying illustration, introduced by Ingersoll-Rand Co., 11 Broadway, New York 4, has a wide variety of shop applications. The tool employs the impact principle developed for Ingersoll-Rand air-powered tools and with standard attachments, is said to apply and remove nuts, drill, ream, tap, drive and remove screws, drive and remove studs, extract broken cap screws and studs, run wire brushes, do hole saw work, drill brick and masonry, and drive wood augers. This general purpose electric tool has been designated the Size 4U by Ingersoll officials and is described as replacing at least four electric shop tools at one third the cost.

In addition to its versatility in application, the tool has practically no torque thrust, torque being converted into energy by the rotary impacting device, and jobs such as running and tightening ⅜ in. cap screws or reaming a ¼ in. hole to 7/16 in. may be accomplished by holding the tool with one hand. This impact tool, which is reversible and is driven through a gear reduction system, runs the same as any conventional electric tool until resistance to spindle rotation reaches a little less than the amount that would stall a regular ¼ in. electric drill. At this point the spring-actuated cam mechanism located on the spindle shaft converts motor power into a series of rotary impacts which deliver power in excess of the ¼ hp rating in the form of blows.

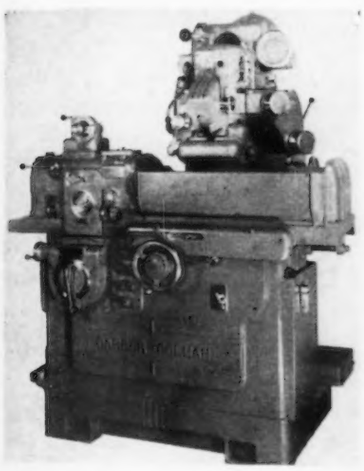
The power delivered by the impact blows, which occur at the rate of 1900 per min under load, is described as sufficient to properly tighten automobile wheel lugs. The tool has a free speed of 2000 rpm and is powered with a reversible, universal 3 amp electric motor which operates on 110 v, ac-dc current.

New Equipment . . .

Recent models in hob sharpening machines, hydraulic grinders, a thread milling machine, disk sander and grinder, ac welding units and hydraulic welding guns are described in the following pages, together with a sizing screen, material handling units such as a fork lift-truck, strip feeding table and lightweight steel pallets, and several small tools.

Hob Sharpening Machine

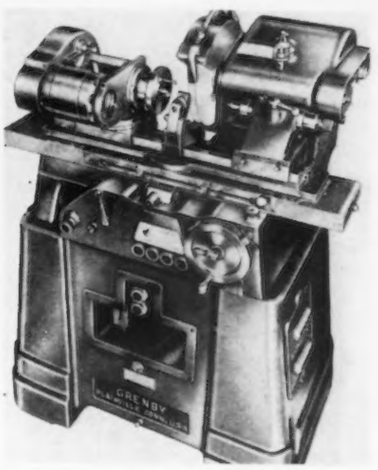
THE automatic hob sharpening machine No. 6-5, introduced by *Barber Colman Co.*, Rockford, Ill., features interchangeability of grinding wheels for high speed or carbide-tipped hobs, precise indexing with table cycle interlock,



diamond dresser mechanism, adjustable hydraulic table speed and stroke, and adjustable grinding wheel speeds. It is said that this new machine insures a high degree of accuracy and finish. It can handle 6-in. diam and 5-in. length work, and has a minimum lead of 8.5471 in. with a 40° sine bar setting. Stock removal, based on 3-in. diam, varies from 0 to 0.0125 in. Index plates include 10, 12, 14 and 16 div. Adjustable spindle speeds include 3600, 4300 and 5000 rpm. Adjustable hydraulic tables permits approximately 5 to 20 cycles per min, while the length of stroke can be adjusted from 3 through 8 in.

Hydraulic Grinders

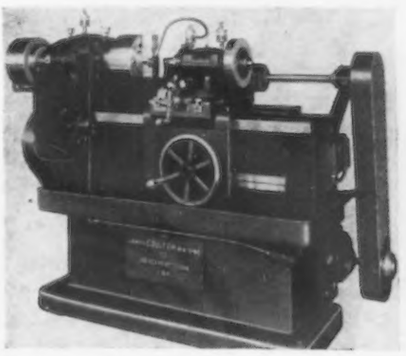
ANNOUNCEMENT of two new hydraulic grinders, an external grinder EG-103 and an internal grinder IG-103, has been made by *Grenby Mfg. Co.*, Plainville, Conn. Either machine can be equipped with two heads to make a combination external-internal grinder. Recommended capacities are 3 in. diam x 10 in. long between centers for the external grinder and 3 in. diam x 4 in. long for the internal grinder. Both can grind work up to the full swing over the 9-in. diam table, which is operated entirely hydraulically even when manually controlled. Regular features include a live spindle work head that takes 5C-1-in. collets, swivels 90° either side of center, taper bayonet lock spindle nose for 3 and 4 jaw chucks, face plates, and dead center attachment. The grinding wheel head swivels 15°



and a ¾ hp motor drives the 10 x 1-in. external wheel or the 15,000 rpm and 32,000 rpm internal spindles. The table has infinite speed changes from 0 to 100 ipm and oscillates a full 10 in. or as little as 1/32 in.

Threading Machine

IN adapting the Coulter type HT and HS hob thread milling machine for the thread milling operation in straight and taper threading dies, *James Coulter Machine Co.*, Bridgeport 5, announces that the work spindle and the cutter spindle are driven by individual motors, thus providing a large range of speeds and feeds. An infinite range of speeds from 100 to 650 rpm is possible on the cutter spindle, thereby maintaining the proper cutter speed when using small diameter milling cutters used in milling small diameter dies. With the standard change gears furnished for the work spindle drive, machine cycles from 26 to

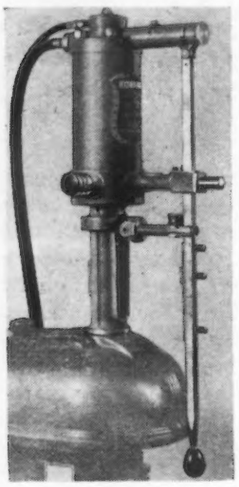


155 sec are possible to handle the range of die sizes within the capacity of the machine. With the use of a relieving attachment, dies with any number of cutting edges can be produced in one revolution of the work, it is said. Round, square or any other shape dies can be held for this thread milling operation by a work holding fixture to suit the character of the die to be thread milled. This machine has capacity for thread milling pipe dies from ⅜ to 2-in. pipe size. The straight model machine has capacity from ¾ to 2-in. standard size straight dies.

Drill Press Feed

THE Hydra Drill, an automatic foot-controlled drill press feed, has been designed by the *General Pacific Corp.*, E. Washington Blvd., Los Angeles 21, to convert single spindle hand feed drill presses into production machines. It is said the feed does not interfere with manual operation of the press. Settings are obtained by an adjustable scale,

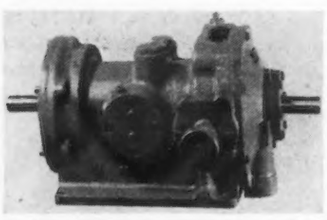
graduated by sixteenths and a micrometer adjustment which is graduated in thousandths. Drill feed is



described as infinite and is adjustable by a feed dial which is also graduated in thousandths. Depth of hole is varied by a graduated dial and a skip-drilling attachment provides rapid traverse from one flange to the next when drilling channels or tubing. A special attachment provides continuous automatic repeating of the drilling cycle. The Hydra Drill is air-operated and hydraulically controlled.

Fluid Power Transmissions

SMALLER, lighter, speedier, reversible variable speed transmissions have been announced by the *Oilgear Co.*, 1301 W. Bruce St., Milwaukee 4. Each variable speed transmission consists of a volumetric, variable delivery, radial rolling piston pump driving a constant displacement radial rolling piston



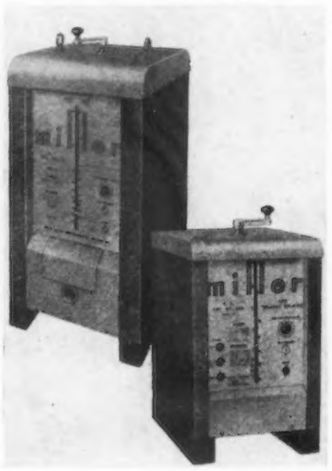
motor. High grade oil, as the fluid power, flows from unit to unit; it provides automatic forced and flood lubrication. A compact case encloses the operating mechanism while integral relief valves in fluid passages protect installation against overload. Compact, interchangeable, flanged control devices are available for every need, it is said. Oil reservoir can be integral with machine or a separate reservoir base attached to the transmission case for remote mounting.

Band Saw

OPERATING on a principle of gravity feed, a metal-cutting bandsaw which acts as two machines has been developed by *Roll-In Saw Co.*, Parma, Mich. As a cutoff saw with gravity feed, the blade rolls into the work, saving wear on the blades, it is said, since correct pressure is automatic. For contour work the blade is locked in a stationary position with a clamp, permitting the cutting of any shape, size or kind of metal and plastic.

AC Welding Units

A SERIES of ac welders have been marketed by the *Miller Electric Mfg. Co.*, Appleton, Wis., which are designed for welding



with the Heliarc process which requires welders of heavy construction. The units incorporate adjustable high frequency current and high duty cycle ratings. The high frequency unit is equipped with a variable control to permit a change of voltage for any application. The Heliarc process, developed by Linde Air Products Co., makes possible the welding of aluminum without flux.

Disk Sander and Grinder

MODEL 1-A Apex 16-in. disk sander and grinder suitable for plastics, wood, and metal has been announced by the *Darling Mfg. Co.*, 8681 Madison Ave., South Gate, Calif. It features a tilt-back guard, slot free table, and squaring bracket. The base is made of

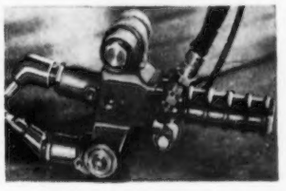
cast iron; table has a precision ground top and measures 10¼ x 22½ in. Power is provided by a ¾ hp motor, single or three phase.

Low-Temperature Rod

A LOW-TEMPERATURE welding rod for use on zinc-base diecastings is available in 3/32 in. diam, round form, from *All-State Welding Alloys Co., Inc.*, 96 West Post Rd., White Plains, N. Y. The rod has a working temperature of only 400°F; it has a high shear strength of 25,000 psi, and it is said to give a perfect color match. It can be used with or without flux.

Hydraulic Welding Gun

A DOUBLE acting, hydraulically operated welding gun and booster has been introduced by the *Dalhart Engineering & Mfg. Co.*, 14287 E. Jefferson St., Detroit 15. Strong uniform welds are achieved as the hydraulically actuated point

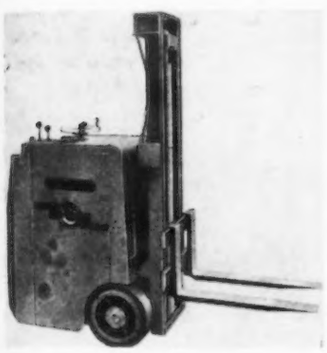


pressure is uniform regardless of wear on points, according to the manufacturer. Uniform hydraulic pressure is also said to eliminate destructive burning and pitting at the point of weld by reducing arcing to a minimum. Mechanical speed of the gun is limited only by the

maximum speed with which a solenoid air valve can be operated. The portable gun may be attached to a bench or pedestal to make a stationary unit with foot controls. Welding point pressure is varied by controlling air pressure on booster which permits a variety of metal thicknesses to be welded with one gun.

Fork-Lift Truck

AN electric fork-lift truck designed for warehouses and plants with narrow aisles has been announced by *Crescent Truck Co.*, Lebanon, Pa. The truck, designated the Palletier, Model LVGH-X, is said to stack 42 x 32-in. pallet loads at a right angle in 8-ft aisles. One man lifts, hauls and tiers from



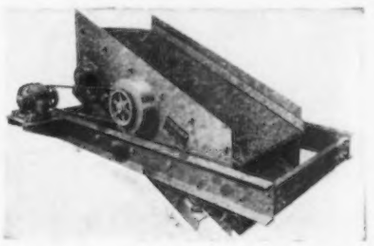
standing position. Capacity is 2000 lb with 36 in. length of load; 1750 lb with 42 in. length of load. Other features include fume-free operation and full magnetic contactor control to protect against forced acceleration.

Lightweight Steel Pallet

A NEW steel pallet, designed to cut down shipping costs through light weight has been introduced by the *Monroe Equipment Co.*, Monroe, Mich. Design of the unit permits the forks of a lift or pallet truck to be slipped between the top and bottom section from eight different directions — four sides and four corners—thus cutting down the maneuvering necessary in crowded factories, warehouses, etc. Top and bottom sections are held together by nine hollow steel posts, crimped to hold the unit together without welding. Available in six sizes, the pallet will hold up to 20,000 lb of boxed or bagged materials or merchandise.

Sizing Screen

A VIBRATING screen known as the CA Concentric-Action screen has been marketed by *Link-Belt Co.*, 307 N. Michigan Ave., Chicago 1. This screen which is



designed to size a large variety of materials, is an inclined floor-mounted or spring-and-cable suspended screen with a balanced vibrator mechanism which imparts a concentric or circular vibrating motion to all points of the screening surfaces. The screen may be used for both medium and heavy duty sizing as well as for scalping and dewatering or rinsing operations. It is made with double or triple decks and in sizes ranging from 3 x 8 ft to 6 x 14 ft. Single-deck screens can be provided by removing the lower deck of the standard double-deck screen.

Electric Controller

CALLED the Rolotac, an electric controller has been developed by the *Ellwell Parker Electric Co.*, Cleveland 14, for use in their electric power industrial trucks, to provide greater current carrying capacity with faster positive action to conserve power and to safeguard the truck's mechanism under difficult operating conditions. The controller is a series of nine "trigger fingers" which are said to

insure instant response and efficient transfer of current.. Each finger comprises a trunioned tube which houses a spring enclosing a plunger. Located above and horizontal to the series of fingers is a ball bearing-mounted cam shaft with cams made of hard fiber. Cam followers transmit motion to the fingers, the followers pivoting on the controller frame. Interchangeability of fingers and their components and the extra large accessible contacts is a feature of the device.

Strip Feeding Table

ADDED to a line of strip and sheet feeding tables, a model with an adjustable tilting top for use with inclined presses as well as horizontal bed types, has been offered by *Lyon-Raymond Corp.*, 3500 Madison St., Greene, N. Y. This model is available in a 2000-lb capacity with table widths from 12 to 24 in. and lengths up to 96 in. including the removable extensions. From a flat position the table top

may be adjusted to a 30° tilt with several intermediate positions. When the correct angle of tilt is determined the table top is securely locked in position by removable pins.

Conveyer Lubricator

A LUBRICATION system for conveyers operating through high temperatures has been announced by *J. N. Fauver Co.*, 49 W. Hancock St., Detroit 1. The system is described as reducing the horsepower needed to drive the conveyers and eliminates time required for continuous hand lubrication. In a typical installation, each unit is mounted on top of the I-beam which carries conveyer wheels, and automatically lubricates the wheel bearings from each side of the two wheels above each hangar. The unit is equipped with a manifold containing nozzles that lubricate all link pins between the hangar trolleys each trip. Equipment for each installation is designed to suit specific requirements.

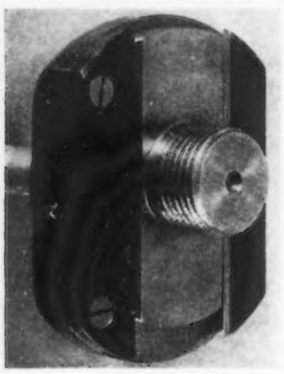
Counterbores

A NEW type of high speed steel counterbore announced by *Mohawk Tool Co.*, 21647 Dequindre Rd., Hazel Park, Mich., is described as

having blades approximately 5 times as long as most counterbores and a radial ground sub-land pilot built into the length of the tool. As the blades are sharpened a pilot already ground to size is automatically developed. The blares are ground back to provide a long pilot and if a short pilot is required the pilot can be ground off to the desired length as the tool is used. The tool is available in fillister screw sizes up to 1 in. Undercutting the blades in sharpening is said to be easily accomplished without touching the preground sub-land pilot.

Elliptical Chuck

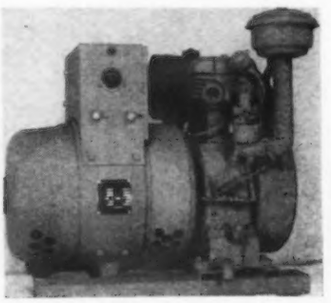
AN elliptical chuck which fastens to the nose of a 9 or 10-in. lathe, and holds a conventional chuck or face-plate which in turn holds material for turning or boring into an elliptical shape has been developed by *H. D. Chambliss*, 111



Clarion Rd., Oak Ridge, Tenn. The chuck consists of a drive-plate which screws on a lathe-nose and rotates with the spindle. Upon the drive plate an eccentric block is held stationary by the shaft through the spindle. A slide, carrying the chuck or face-plate and work, reciprocates with respect to the drive plate, but rotates with it. The two movements combine into elliptical motion. It is said the chuck can be used for turning and boring elliptical or oval shaped punches and dies, elliptical gears, bars or mandrels and three dimensional forms.

Light Plant

KNOWN as the Kato light, a 2500 w, ac light plant with dc winding of sufficient capacity to charge standard 32 v glass jar type batteries has been developed by *Kato Engineering Co.*, Mankato, Minn., for installations where it is desirable to operate battery-powered devices. The unit is selfexcited and cranks from 24 v of battery. The plant is complete with battery charging relays and the charging



rate automatically adjusts itself. In operation, the plant is described as providing little dc battery charging when it is carrying a full ac load. When the plant is carrying only a partial ac load, the battery is charged at a proportionately greater rate. The generator is mounted directly on the side of a one-cylinder engine. The plant may be furnished with full automatic control or remote control. A voltage regulator is said to hold ac voltage within 5 v change between no load and full load.

Piston Rings

DEVELOPMENT of the Ceco ring, a piston ring said to have wearing qualities that extend its useful life threefold, has been announced by the *Chambersburg Engineering Co.*, Chambersburg, Pa. Tension, hence sealing properties, is maintained throughout life of the ring, it is claimed. The ring is heated by induction and automatically quenched and tempered.

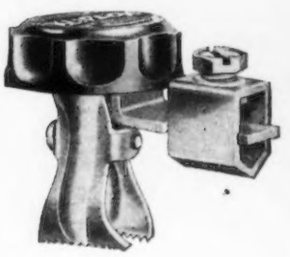
Carbon Seal

ANNOUNCEMENT of a high-speed carbon ring oilseal has been made by *Gits Bros. Mfg. Co.*, 1846 S. Kilbourn Ave., Chicago. Developed especially for shaft seal

use, these carbon rings have a low coefficient of friction, it is said, and self-lubricating qualities. Sealing is accomplished by means of a radial seal joint made by positive contact between a stationary lapped seal surface built into the seal unit and a rotating lapsed sealed surface. The seal has been designed to transfer wear to the radial seal joint rather than to the shaft surface. These carbon seals may be used for horizontal and vertical shaft applications.

All-Purpose Clamp

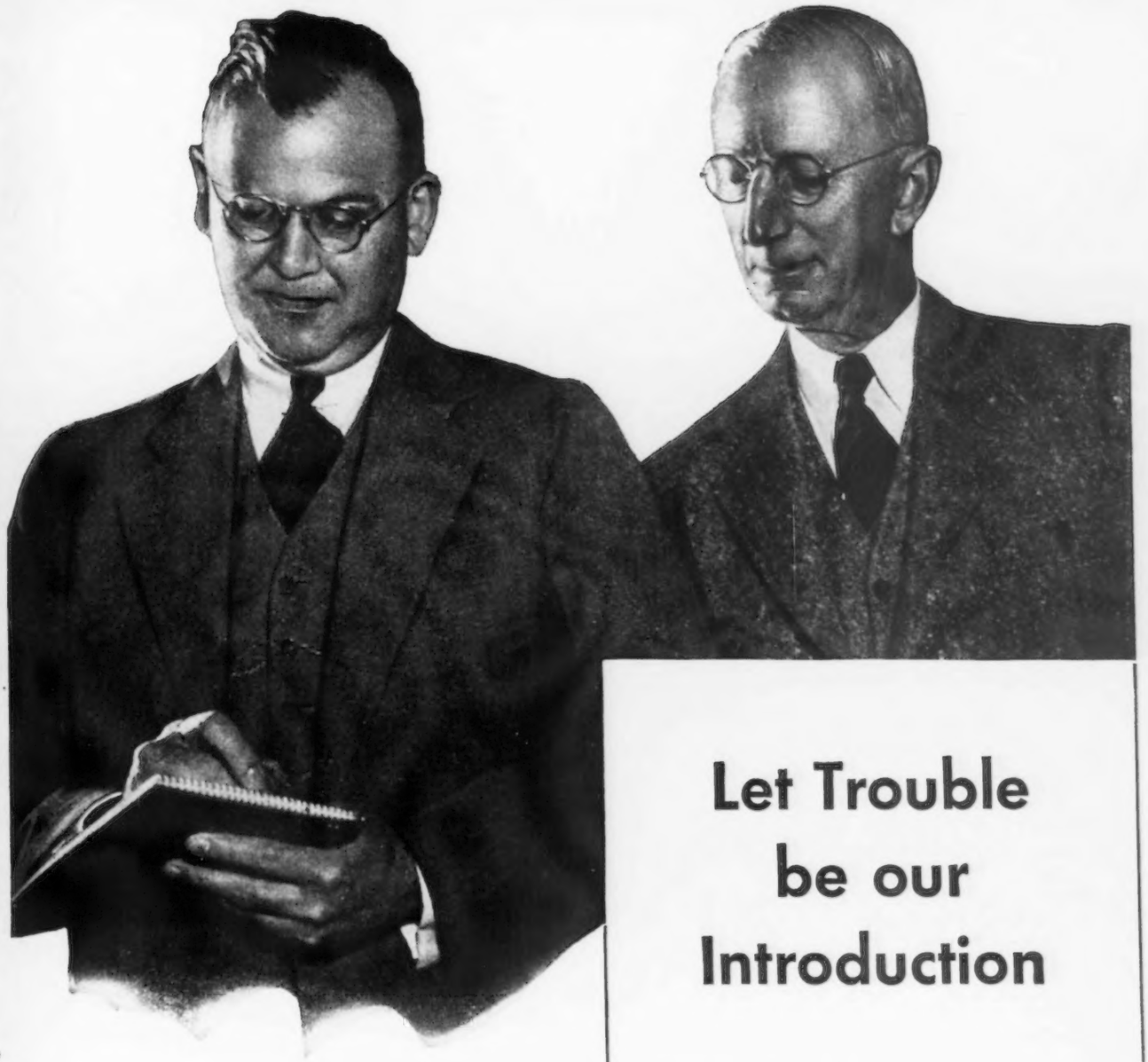
A HEAVY duty, shock-proof clamp, known as the U-66 all-purpose Kliplok test clamp, has been announced by the *Trico Fuse Mfg. Co.*, 2948 North 5th St., Milwaukee 12. The clamp is said to supply a vise-like grip on flat or round objects up to 1 in. diam or width. A slight twist of the finger-tip knob is said to exert tremendous pressure. It has been developed for attachment to ends of cords on portable equipment such as sanding machines, floor polishers, saws,



furnace cleaners, drills, welders, etc. It will carry up to 150 amp continuously and 200 amp intermittently. A solderless lug accommodates No. 2 wire min, No. 0 wire max.

Safety Goggle

DESIGNED for work in hot and humid atmospheres where chemical and dust hazards exist, a rubber-frame safety goggle has been announced by the *American Optical Co.*, Southbridge, Mass. Feature of the 705 super-vent goggle is an ingenious nosepiece with an inhalation and exhalation valve to prevent fogging and steaming of the goggle's acetate single lens. The frame of the goggle is molded from nonirritating natural rubber and conforms to the contours of the face. Wide-angle vision is provided by the large size of the lens and the curved face form.



Let Trouble be our Introduction

THERE'S nothing like trouble to bring people together. That's how some of Revere's closest friends were gained—through a mutual struggle against difficulties, troubles such as occasionally beset any business.

Take the case of an important product, originally developed for war uses, now finding many applications in peacetime services. When manufacture began, rejections ran extremely high, over 40%, costs were skyrocketing, and badly-needed production was being lost. The maker asked if we would care to collaborate in solving the problem. Of course we would! After studying the subject in detail (and also under conditions of the greatest secrecy), we suggested a radical change in the properties of a non-ferrous metal used in the manufacture of the vital part with which so much trouble was being experienced. New processes of manufacture were developed, and in a short time test runs of the recommended material proved successful. Rejections of finished units dropped to less than 1%. Thus an expensive and vexing bottleneck was broken, and we gained a new customer and a firm friend.

This success story demonstrates that Revere has an open mind as well as an informed one, and is always ready to question the customary, find new answers to new problems, or to old ones, for that matter. If something is worrying you in your employment of non-ferrous metals, get in touch with Revere, not for ready-made answers, but for wholehearted cooperation, a joint search for better results. This help is given freely, without obligation, through the Revere Technical Advisory Service, which has at its command the knowledge and facilities of our laboratories, and the accumulated experience of the entire Revere organization.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

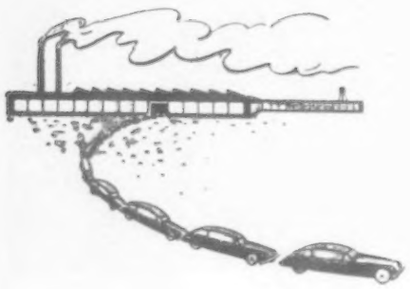
230 Park Avenue, New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

Assembly Line . . .

WALTER G. PATTON

• Ford's "Great New Tractor" is introduced . . . Dearborn Motors Corp. offers stock participation privileges to Ford executives . . . Dodge holds truck exhibit.



DETROIT—As the first Ford-engineered postwar product, the new Ford tractor which was introduced this week drew considerable attention, not only from the agricultural field but from Ford's competition in the automobile industry.

The usual "better-than-ever" claims made for the new design are easily justified. The new Ford model 8N offers ample evidence that competent engineers, stylists and market researchers working together as a team can accomplish much toward producing a better and more usable product.

The price is $1,095 f.o.b. factory. The new tractor offers many advantages over previous Ford models as to performance, maneuverability, ease of handling and versatility.

Outstanding improvements to the Ford tractor line include a new transmission with four speeds forward and one reverse, an improved hydraulic lifting device for farm implements, a new drawbar height control mechanism and automotive type steering.

To facilitate easier operation and driver control, right and left brake pedals are brought together on the right side of the tractor, permitting operation of the right and left brake with the right foot only. This leaves the left foot free to operate the clutch. Turning of the new tractor is greatly facilitated by this new brake setup, according to tractor operators.

The tractor drawbar can now be carried at any desired height and is controlled by a small lever readily accessible to the driver. Utilizing the hydraulic lift, implements can be raised and lowered easily with perfect control while the driver remains in his seat. Faster stopping, shorter turns and easier servicing are claimed for the newest design as well as protection against damage by field obstructions.

Another innovation is a hinged radiator grille which swings open to permit cleaning the grille and radiator. It is believed that this device may also be adaptable for passenger cars and trucks if desired.

Overall weight of the new tractor is approximately 200 lb more than the previous model. Combination running board and step plates have been added to the present model. Both front and rear wheels are adjustable to permit proper wheel spacing when planting and cultivating.

Among the variety of farm implements that can be operated by the present Ford tractors are moldboard plows, disc plows, cultivators that attach in front and rear of the tractor, disc, spike-tooth and spring-tooth harrows, weeders, power saws, bulldozer blades, snow plows, scrapers, forage holders, and post-hole diggers. A new front-end loader originally made available for farm use has been widely adopted by industry for materials handling, according to Ford engineers, and is finding increasing favor with American railroads.

Dearborn implements are produced by independent companies in accordance with designs and specifications developed by Ford engineers. Close cooperation between the Ford research and development departments and its suppliers is maintained to facilitate this development work.

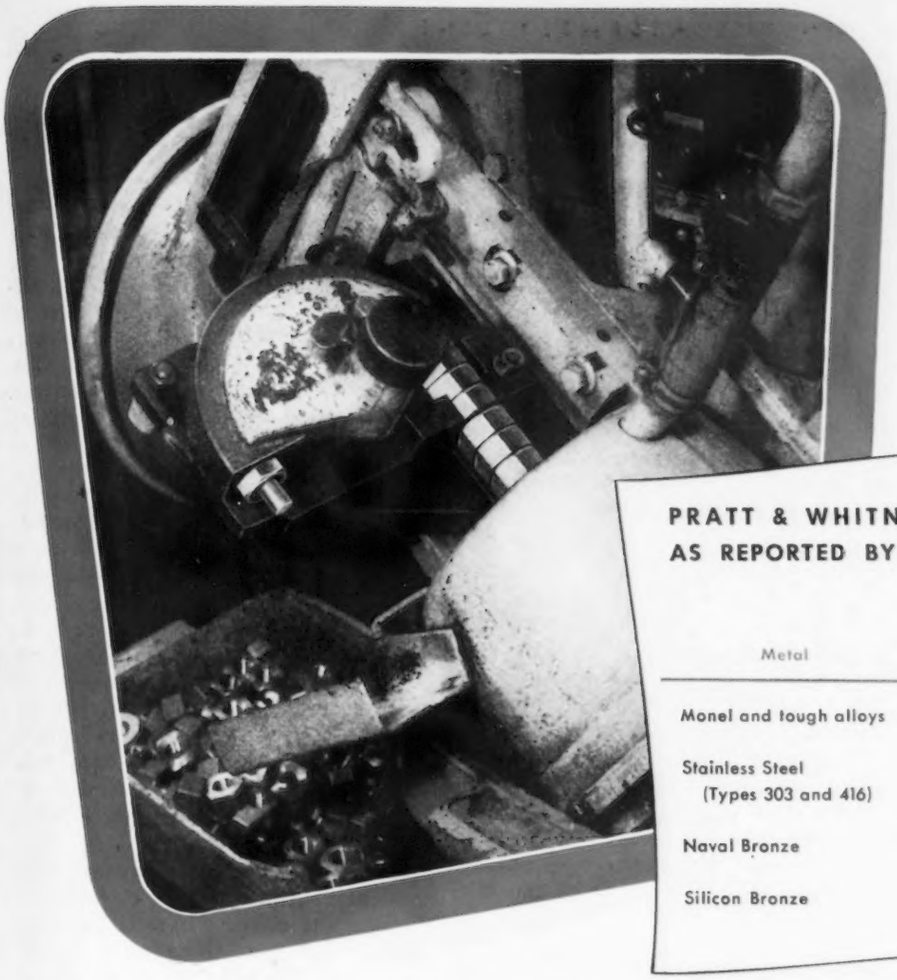
FORD will market the new tractor through Dearborn Motors Corp., national marketing organization formed in November, 1946, to take over distribution rights previously held by Harry Ferguson, Inc. The company expects to sell 50,000 Ford tractors and 200,000 farm implements during the remaining months of 1947. Current production is 400 tractors per day. This will be increased sharply upward in August, according to company officials.

The new company has 33 distributors and more than 3000 dealers in United States, Canada, Alaska, Hawaii, Mexico and Cuba. Only one lone dealer, it is reported, declined to change over from the Ferguson organization to the new Dearborn company.

There is much speculation here as to the marketing organization for the new Ford tractor-Dearborn Motors Corp. Formed by Frank R. Pierce, former GM vice-president, the company has on its board of directors, a number of Ford executives including Ernest R. Breech, executive vice-president; J. R. Davis, vice-president in charge of sales, and Albert J. Browning, vice-president in charge of purchasing. Also a member of the board is Ernest C. Kanzler, chairman of the board, Universal CIT Credit Corp., who is the only member of the Ford family holding stock in the new company.

Neither Ford for Dearborn officials would divulge the extent of their ownership in the new distributing company although the privilege of stock participation in the new enterprise is rumored to be one of the inducements that has attracted so many top executives from GM and other companies into the Ford organization. The possibility that financing may be available either from Ford or CIT Credit Corp. has also been mentioned. All authorized stock in the new company has been issued, it is reported, and Messrs. Pierce, Kanzler, Breech and Browning are known to be stockholders.

FORD was not the only Detroit manufacturer looking to its postwar market this week. As a forerunner to 63 truck shows to be held throughout the United States this summer, Dodge trucks equipped with the latest postwar bodies and special equipment were on display at the Detroit Fair Grounds.



Silicon bronze nuts, both formed and milled, were threaded on a National Precision Bent Tapper equipped with a P&W ¾"-10 NC hook tap and nib at a 45% reduction in tap costs for H. M. Harper Co., Chicago.

The H. M. Harper Co. also uses P&W improved sectional type taps to thread stainless steel and other tough alloys.

PRATT & WHITNEY TAP PERFORMANCE AS REPORTED BY THE H. M. HARPER CO.

Metal	P&W Tap Life in Hours	Percent of Increase Over Previous Tap Life
Monel and tough alloys	40-45 hours	150
Stainless Steel (Types 303 and 416)	50-55 hours	200
Naval Bronze	70-80 hours	200
Silicon Bronze	40-45 hours	300

P&W Tap Engineering in Action

Tapping results like these are not unusual — hundreds of other manufacturers are profiting from P&W tap engineering in action — because P&W taps are *engineered for the job.* Only experienced specialists like P&W engineers can develop designs and heat treating methods that deliver long-lived, free-cutting taps. Only a background like Pratt & Whitney's can provide manufacturing facilities which meet the demand for accurate, job-tested cutting tools of a uniformly high quality.

Pratt & Whitney taps are available in either carbon or high-speed steel, and with cut threads, commercial ground threads, or precision ground threads — tailored to give you the accuracy required. Let a P&W engineer help you cut costs, reduce breakage, increase speed on your tapping machines with P&W precision taps. Write for full information.

Pratt & Whitney

Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

More than 217 truck bodies were shown by the 51 exhibitors participating in the show. Approximately 300 producers of special truck equipment were represented. A partial list of the special types of equipment on display gives some idea of the variety of special equipment now being offered to truck buyers: Burma Safety Fuel Tanks; Austin Fifth Wheels; Ohio National Coal Unloading Hydroveyors; Gramm Unisteel Van Bodies; Freuhauf Refrigerated Panel Bodies and Stainless Steel Tandem Trailers; Thornton - Tandem Conversions; Knorr-Maynard "No Spin" Differentials; M.H.S. Saddle Tanks; Bostrom Level Ride Seats; Monroe E-Z Ride Seats; Dodge Sleeper Cabs and many other pieces of equipment little known outside of the trucking industry.

Curiously enough, the value of truck accessories and special equipment has grown in recent years until the dollar volume is said actually to exceed the cost of the trucks that use such equipment. Practically all of this special equipment is produced today outside the truck producers' plants although, of course, with the cooperation and encouragement of the truck manufacturers.

APPARENTLY the well publicized steel shortages affecting automobile production are still unappreciated in some parts of the country. Typical of letters sometimes received by Detroit firms is this stirring appeal from a manufacturer located in Pender, Neb.

"From time to time we have aluminum and steel scrap including cast iron for sale or trade. It is all short lengths and clean. We are anxious to sell this material to someone who can supply us with 12 to 16 gage hot-rolled 1010 black sheets and 24 to 28 gage galvanized sheets.

"We have one car load of iron scrap ready to load now and will be pleased to reciprocate upon good steel offerings."

Scrap prices being what they are, it is altogether possible that some Detroit manufacturers would be glad to pick up this offer on reasonably satisfactory terms.

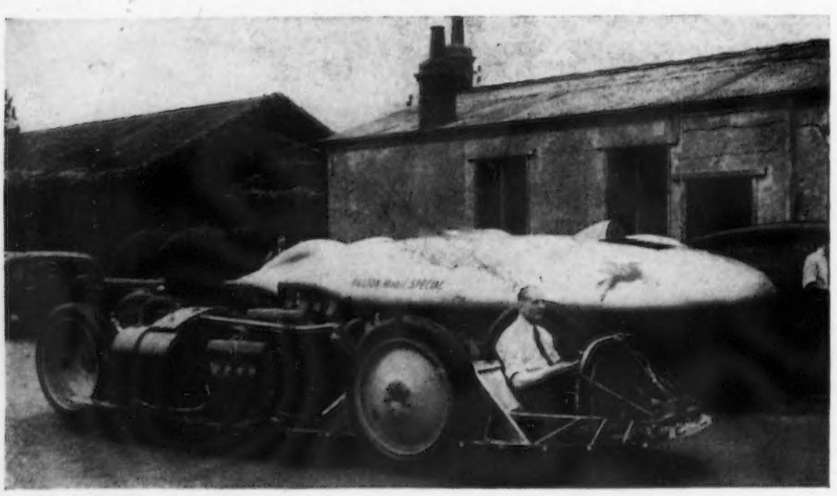
Some idea about the cost of changing models is available from figures recently quoted by Ernest R. Breech, executive vice-president of Ford Motor Co. In addressing more than 2000 dealers assembled in New York recently Breech told the dealers that Ford had already spent $17 million in jigs, tools and dies getting ready for the 1948 Lincoln, Mercury and Ford cars. Henry Ford II declared the new line would embody changes as "drastic as the switch-over from model T to model A."

It requires approximately 680 lb of metal to produce a Chevrolet engine without accessories such as generator, carburetor, etc. A Chevrolet engine "in-the-rough" before final machining requires the following bill of materials:

Steel, carbon and alloy	266.1
Copper products	9.3
Malleable castings	4.0
Grey iron castings	406.9

Small amounts of aluminum and tin are also necessary.

TO HAVE ANOTHER GO: *John Cobb, holder of the world land speed record of 369.7 mph will try to boost his record this August on the Bonneville salt flats. The fuselage at this stage is still detached from the carcass.*



Kaiser-Frazer Reports Profit at Willow Run

Detroit

• • • **Kaiser-Frazer** is operating the huge Willow Run plant at a profit.

K-F earned "a substantial profit" during the second quarter of 1947, according to an announcement by Edgar F. Kaiser, vice-president and general manager. K-F also set a new production record of 12,039 passenger cars in June. Estimated sales of the K-F Corp. and its subsidiaries for the month of June are approximately $22 million compared with sales of $11,700,000 for the entire year of 1946.

Production schedules for the balance of 1947 average 15,000 automobiles per month, according to a company spokesman. For the month of June, Kaiser-Frazer's output of passenger cars was topped only by the automobile industry's "Big Three."

The K-F Detroit Engine Div. operating facilities leased from Continental Motors Corp. built 9064 engines in June, an increase of 8 pct over the previous month. In addition, engines are also being built at Continental's plant in Muskegon.

Edgar F. Kaiser has predicted a net profit of $8 to $10 million to be earned in 1947, if available supplies permit an average production schedule of 15,000 cars a month for the remainder of 1947.

New Cleveland-Cliffs Firm

Cleveland

• • • **A new Cleveland-Cliffs** Iron Co., with assets of $95 million, officially came into existence July 9 when the merger of the old Cleveland-Cliffs Iron Co. and Cliffs Corp. was declared effective by Edward B. Greene, chairman of the board of the new company.

The new company succeeds to some $34 million of steel stocks formerly held by the two companies, as well as net current assets and fixed assets of the 97-year old Cleveland-Cliffs Iron organization, which include the second largest iron ore reserves in the Lake Superior district as well as mines, a railroad, public utility plants, timber holdings, docks and a fleet of vessels.

● A heat of Wisconsin steel pours into the ladle where it is Sulfite-Treated. That means it will be far more machinable than ordinary steel. *And*—physical properties remain completely satisfactory.

Solve your machining problems with Wisconsin's magic metal—Sulfite-Treated Steel. Check your requirements with our sales and metallurgical departments.

WISCONSIN STEEL COMPANY
(Affiliate of International Harvester Company)
180 North Michigan Avenue Chicago 1, Illinois

WISCONSIN SULFITE-TREATED STEEL

Washington . .

EUGENE J. HARDY

• Government lending operations being curtailed . . . Congress insists on direct financing from Treasury Dept. . . . Recovery rate of federal lending agencies high.

WASHINGTON—With plenty of private capital available, government lending operations are being curtailed; slowly perhaps, but nonetheless surely. Congress has taken steps to restrict the activities of federal lending agencies and is also keeping a closer watch on their operations. For example, all government corporations must be sanctioned by Congress by June 30, 1948, if they are to stay in business. Another example of congressional thinking along these lines was indicated by the restrictions placed upon the Reconstruction Finance Corp. in the bill which extended the agency until June 30, 1948. In addition, seven of the smaller lending agencies are being liquidated at the present time.

Government lending, since its inception on a broad scale about 30 years ago, has mushroomed and on June 30, 1946, the last date for which comprehensive data are available, balance sheets of the major lending agencies showed that over the 30 preceding years loans totaling $41.2 billion had been made, of which $8.9 billion had been loaned to private business, including manufacturing enterprises, banks and private enterprises of all kinds.

In a report prepared by the Legislative Reference Service for Sen. George D. Aiken, R., Vt., it is shown that on June 30, 1946, there were 35 government lending corporations and certain other unincorporated agencies which had loans receivable. However, of this total, the report deals with only 14, 11 of which are corporations and 3 are unincorporated lending agencies. The 21 which were excluded were left out either because their lending activities were insignificant or because they are in the process of liquidation or absorption.

The government lending institutions covered in the survey are those under the jurisdiction of the Federal Loan Agency, including the RFC and its subsidiaries; the multipurpose lending agencies of the Dept. of Agriculture; those in the field of housing under National Housing Administration; and the Export-Import Bank.

WHILE private business received approximately $8.9 billion of the total loaned by a beneficent government most of it coming after the birth of the depression-spawned RFC, agricultural interests accounted for the lion's share—a total of $24.2 billion. Public and private housing received $7.1 billion. Slightly less than $1 billion had been loaned to foreign countries by the Export-Import Bank, not including the commitment of $1.2 billion to France.

Perhaps, the most remarkable fact brought out by this historical study is the repayment record. Of the $41.2 billion total which had been disbursed by June 30, 1946, credits to principal amounted to $35.1 billion; the loans had earned interest of $4.2 billion, and there was outstanding a gross principal of approximately $6 billion.

The credits to principal include write-offs of loans. Cumulative figures for these write-offs are not available, but during the fiscal year 1946 they amounted to about $7 million. As of June 30, 1946, the total amount of principal and interest reported to have been in default exclusive of write-offs, is $265,451,297, or 4.3 pct of outstanding loans, or less than 1 pct of the total amount of loans which had been made.

The recoveries made by these agencies are particularly remarkable in view of the fact that the great majority were authorized by Congress in cases where private credit was not obtainable due to depressed business conditions, poor risks and other unfavorable factors. In addition, many of the authorizations were made to finance social experiments—a risky business at any time.

AS of June 30, 1946, the combined assets of these agencies amounted to $42.3 billion as against liabilities of $20 billion. Of the capital interest of approximately $22.3 billion, the Federal Government owns $21.9 billion while about four tenths of $1 billion is owned by private interests. A portion of both the assets and liabilities are interagency, that is, are receivables and payables within the federal structure. The book assets of these agencies exceed the total government investment of $39.8 billion by $2.5 billion.

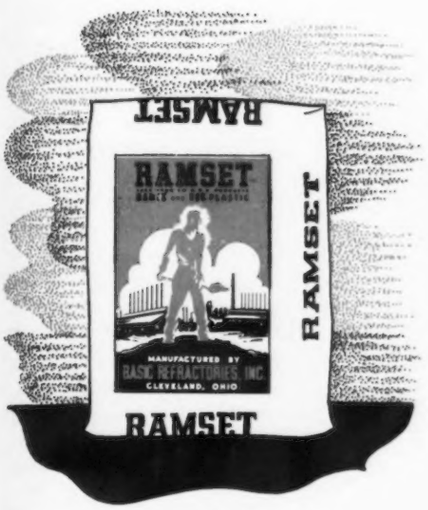
In general, Congress is interested in controlling the lending agencies by restricting their method of capitalization to direct advances from the Treasury Dept. at an interest rate which is not less than the cost of the money to the Treasury. These policies, concurred in by the President, were first set forth in the RFC extension and can be expected in future bills dealing with any of the lending groups.

Another method of control, applying to RFC and all other lending groups, was provided for in a law passed in December 1945, authorizing the General Accounting Office to conduct annual audits and report to Congress. The Senate Committee on Expenditures in the Executive Dept. reports that the GAO audits have been most satisfactory and are setting a precedent in federal fiscal reporting. In this way Congress can be informed on the corporate activities which may be profitably and safely liquidated.

In extending RFC for another year, Congress made it clear that it had two objectives in mind: (1) To curtail operations at a time when private financing was readily available, and (2) to control more

IT TAKES A STEEL YARDSTICK

to measure a Basic refractory



RAMSET

Successor to B.R.I. products Ramix and 695 Plastic

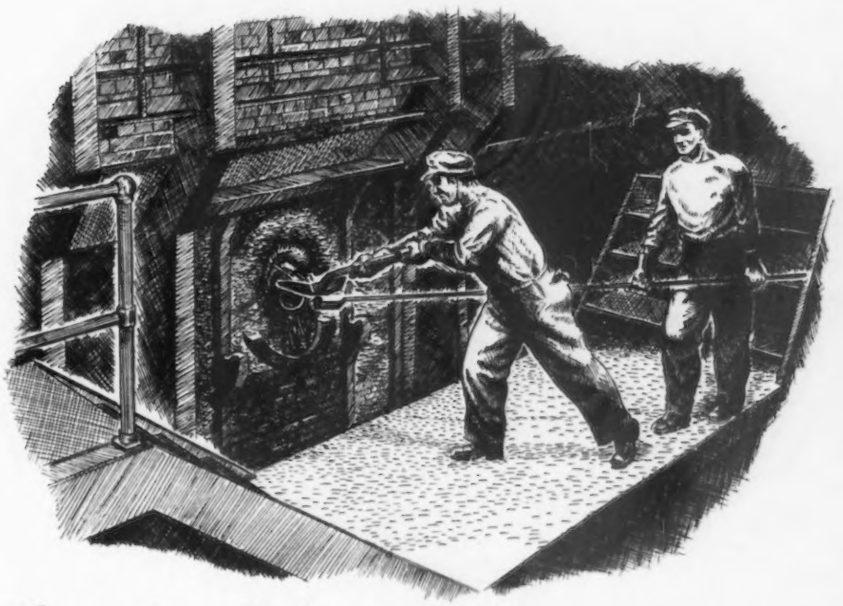
THE chemical composition of a heat of steel does not fully determine the mechanical properties of a bar made from it. You must also know the physical structure of the steel for a sound appraisal.

Similarly, to judge the value of a basic refractory, you should measure the refractory with that same steel yardstick — chemical composition and physical structure.

The amount of magnesia by chemical analysis is only one basis for evaluating a basic refractory. But equally important as a measure of serviceability, is the structure, or mineral form in which the magnesia is present. Of the several mineral forms in which MgO can exist in a refractory, open hearth men are agreed that the most desirable is PERICLASE, or crystalline magnesia.

RAMSET contains approximately 67 percent of magnesia by chemical analysis, *all of which is present as the refractory mineral periclase.*

RAMSET is recommended for new hearth construction, for piping tapholes, and for both hot and cold repairs to open hearth and electric furnace hearths.



Basic Refractories Incorporated **845 HANNA BUILDING, CLEVELAND 15, OHIO**

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rigidly the operations of the agency. These objectives become clear when the restrictive provisions of the extension act are studied. For example, the borrowing authority of the RFC for new commitments (loans, purchases, and other activities) is limited to $2 billion as compared with a peak in RFC commitments of about $18 billion. Congress also set a maturity date of Jan. 31, 1955, for all new activities; prohibited real estate loans; prohibited the sale of RFC obligations to the investing public —they may now be sold only to the Treasury; ordered the liquidation of RFC's wartime subsidiaries; and ordered abolition of the 1 pct rate on RFC borrowing; the Secretary of the Treasury was given the authority to fix this interest rate.

DESPITE the fact that the extension was for 1 year only and the restrictions placed on RFC operations, it is extremely unlikely that the agency will be liquidated entirely. While competition with private industry has been claimed by many legislators, this feeling will not be strong enough to order liquidation of the agency next year with a presidential election coming up. The financial needs of small business will also influence congressional minds. In addition, many influential members of Congress feel that the organization should be maintained, on a smaller scale if economy so dictates, in anticipation of any future economic crisis.

The RFC's lending record has been good; however, the restrictions ordered by Congress, particularly those relating to interest rates, may change the profit picture of the agency. From the time of its creation in 1932 through June 30, 1946, the agency had made loans totaling more than $8 billion; credits to principal amounted to $6.9 billion; and interest earned totaled $800 million. Principal outstanding at that time was $1.3 billion and the total amount in default was about $99 million.

RFC loans have gone to every conceivable type of business activity. Industrial firms receiving substantial loans over the past 15 years include: Sheffield Steel Corp.; Edw. G. Budd Mfg. Co.; American Bantam Car Co.; Beech Aircraft; Glenn L. Martin Co.; and the Southland Paper Co. This partial listing is merely representative of the larger industrial enterprises that have received RFC funds. Not included are thousands of small as well as larger firms.

The profit from lending activities, the primary purpose for which the agency was created, totals more than $500 million. This fine showing is qualified by the fact that RFC has been able to borrow from the Treasury at an interest rate of 1 pct and then lend the same money at higher interest rates. While this has naturally resulted in a profit to RFC, it has also resulted in a loss to the Treasury of the difference between the interest cost to the Treasury of borrowing the money to lend to RFC and the interest paid to the Treasury by RFC. This situation will change now that the Secretary of the Treasury has the authority to fix the rate of interest.

The other activities of the RFC, those foreign to its basic purpose, notably the wartime jobs assigned to the agency, present a different picture. Wartime functions, including preclusive buying of strategic materials, stockpiling, plant construction, and subsidization, have cost the government more than $5 billion. These losses or costs, may reach almost $9 billion, without deducting the value of certain facilities acquired by RFC and possibly to be declared surplus without reimbursement or credit. These assets are considerable and their value will offset to a substantial extent the total loss involved in RFC's wartime operations.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THAT'S HIS FAVORITE FLOWER AN' THAT'S HIS FAVORITE SMOKE!
AND WHEN HE DOES GET A MINUTE TO ENJOY 'EM, THEY'RE BOTH DEAD!
REPAIR UNDER WC
7-18
J.R.WILLIAMS
T. M. REG. U. S. PAT. OFF.
LOST LOVES
COPR. 1947 BY NEA SERVICE, INC.

Government Suit Ended

Washington

• • • **A government suit** which has been hanging fire since December 1936 has been brought to an end with consent judgments totaling $38,000 being paid by six manufacturers of electric wire and cable manufacturers.

The action was brought by the Justice Dept. in the District Court for the Southern District of New York to recover civil penalties for alleged violation of a cease and desist order issued by the FTC in December 1936.

Judgments of $7500 each were paid by American Steel & Wire Co. of N. J., Worcester; Anaconda Wire & Cable Co. and Phelps-Dodge Copper Products Corp., both of New York; General Electric Co., Schenectady; and The Okonite Co., Passaic, N. J. A judgment of $500 was paid by the General Cable Corp., New York.

SHEFFIELD MACHINE TOOL DATA

MFG—No. 114

CUT COSTS OF PROFILING TUNGSTEN CARBIDE TOOLS

Solid tungsten carbide punch and split type die were ground on the Micro-Form Grinder —16 hours for punch and 8 hours each for two die sections.

Die has .0005″ taper per inch and clears the straight punch by .0005″– Inspection proved all dimensions were held to better than customers' required tolerance.

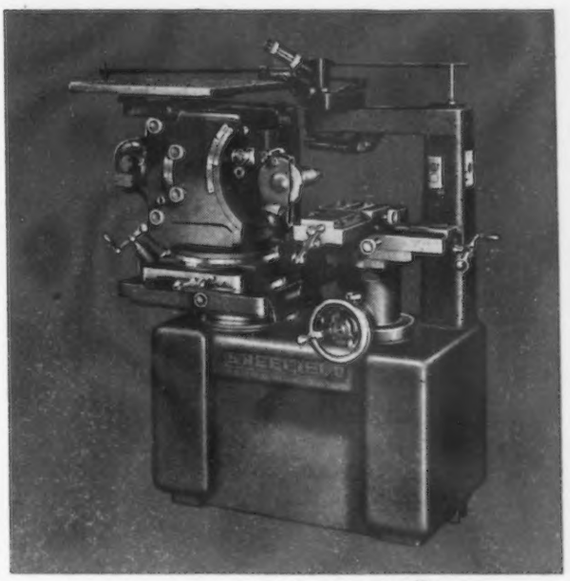
Grinding was performed directly from 50-1 layout made on an engineer's detail glass. Work was ground and checked without being removed from the Micro-Form Grinder.

WRITE FOR NEW 24 PAGE BOOK ON THE MICRO-FORM GRINDER

Please feel free to send us prints and detailed information about your form grinding problems — engineering consultation without obligation.

Use the Sheffield Micro-Form Grinder For Precision Profiling Steel or Carbide

The Sheffield Micro-Form Grinder is especially suitable for the finish grinding of precision profiles on tungsten carbide. The small, relatively low cost, diamond wheels are not formed to any precise contour for the grinding operation—therefore, there is no waste.



See actual demonstrations at Sheffield Booth No. 202, Machine Tool Show, Chicago, September 17-26.

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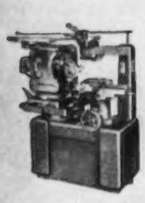

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West Coast . . .

ROBERT T. REINHARDT

• Coal miners' gains misrepresented by western press according to Mr. Fairless who attempts to clarify wage contract . . . Aluminum consumption boosted in Seattle.

SAN FRANCISCO—Loathe to leave the mainland for a vacation in Hawaii—which he appeared to need—without attempting to straighten out what he termed "misunderstanding" in connection with the settlement of the coal wage contract, Benjamin F. Fairless, president of U. S. Steel Corp., called local newsmen in a few hours before sailing time.

Averring that he had read statements in western newspapers to the effect that the miners had gained wage increases of as much as 44½¢ an hr, Mr. Fairless stated he felt it essential that the true facts be presented. These facts were as reported in THE IRON AGE, July 10, p. 96.

Apparently some newsmen and commentators had been taking the old daily wage total of $11.85 which prevailed for the 9-hr day and divided it by the hours worked to arrive at an hourly rate of approximately $1.32. They then divided the new rate of $13.05 per day by the 8 hr to be worked under the new contract and arrived at an hourly rate of approximately $1.63 which is obviously about 31¢ an hr higher than the old rate. They then must have thrown in a few pennies per hr for the 15 min extension on lunch time and perhaps included some part of the increased contribution to the welfare fund.

Mr. Fairless made no attempt to explain how the 44½¢ figure was arrived at, but he did insist that, "The coal miners will get $1.20 a day more in take-home pay for working 1 hr less a day under the new contract. That's all there is to it."

Otherwise keen and alert newsmen failed miserably attempting to arithmetically see eye to eye with Mr. Fairless. The best most of them could do was to arrive at the conclusion that a miner who once got $11.85 for 9 hr work and was now receiving $13.05 for 8 hr work had increased his hourly rate by approximately 31¢ an hr.

Frankly stating that the sole purpose of the discussion with newsmen was to straighten out "honest misstatements" in connection with the coal wage settlement, Mr. Fairless refused to be led far astray. However, he did state under questioning that the increased cost of producing coal would be approximately 75¢ per ton. Questions pertaining to the effect this and other rising steel producing costs would have on the ultimate selling price of steel were neatly paried with reference to a statement released in the East which said, "No decision on prices is likely to be reached until after our board of directors meeting July 29."

While Mr. Fairless refused to become involved in any questions other than those related to coal, there were many which newsmen would liked to have asked. Recent hearings in Los Angeles and Seattle on gray market steel haven't done much to placate the feeling of revolt among steel users and the public in the West who are paying as much as three times the eastern market price for scarce items. Manufacturers paying these prices for steel in order to stay in business aren't ashamed to admit the increase is being passed along to the public.

Whether steel producers should and can police their sales to eliminate the gray market aren't uncommon questions among those who interpret the news to the public.

SEATTLE—While evidence indicates that aluminum production nationally is abreast of demand and that at least one of the major producers is curtailing production of ingots, local fabricators are doing their part in extending the use of this light metal.

Norpac, Inc., a wholesale jobbing firm, is purchasing large quantities of aluminum sheets from the major producers, cutting it and fabricating it into sections for the manufacture of aluminum houses and garages. These buildings are a strictly local development with all of the engineering and design work done here. The first display models have been made and large-scale production is reported to be pending the establishment of dealers in the 11 western states.

Houses and garages have sheet aluminum siding and roof, with wooden studding ready to receive any type of interior siding such as plywood, plasterboard, etc. There are four types of houses: 12 ft by 24 ft cabin type with a porch-garage; a house with 432 sq ft of floor space and an 8 ft by 12 ft porch-garage; one with 480 sq ft and an 8 ft by 12 ft porch-garage; and a 576 sq ft affair with two bedrooms.

The manufacturers are placing a great deal of confidence in the export market on the basis of inquiries already received from Alaska, South America and the Philippines. Carl Amussen is president; W. C. Sparks, secretary and sales manager; J. M. Brockman, in charge of engineering and development.

Pacific Car & Foundry Co., which has long been established in bus body production, is now making a sport trailer of aluminum. They have already contracted for delivery of 500 and negotiations are underway for additional contracts, it is reported. Production is slated at 10 trailers a day and more than 100 have already been produced.

The trailer is a 2-wheel affair that folds up and becomes about 3 ft deep when not being used as living quarters. The entire top

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Silver brazing bellows assemblies with new 750-watt TOCCOTRON.

NEW LOW-COST TOCCOTRON
the portable bench-type induction heating unit

HERE is an induction heating machine that's as simple to hook up and operate as a portable radio. The new 750-watt (*output*) TOCCOTRON operates from a 110-volt, 60-cycle supply and does not require any water connections. This simplicity of installation *increases the flexibility* of induction heating. You can set up this compact bench-type unit *easily and quickly in any location* for small or large runs . . . to adapt induction heating readily to changing production requirements. It is designed primarily for silver brazing and soldering but can be used for hardening, annealing or forging (within its power capacity). Available for immediate delivery.

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folds backward and down and rests on the ground where it becomes the floor of one room. The second room is the bottom of the trailer. Two steps join the two rooms together. The top room is used for sleeping and is equipped with two spring beds and the entire "house" is covered by a tent-like top. Other equipment includes table, chair and gas stove. The sales price is reported to be slightly more than $800.

Because local lumber mills were shut down for approximately 2 weeks, Pacific's rail car line has been down for the same period of time and was expected to get back into operation early this week.

Officials of the Boeing Aircraft Co. were enthusiastic over the performance of the first of their giant Stratocruisers and are confident of early certification by the Civil Aeronautics Authority which will clear the deck for the production of a large number of these ships already on order. Production of the 55 Stratocruisers and 133 B-50's already on order will give a boost to the aluminum market to the extent of approximately 8½ million lb.

This week Boeing is taking the wraps off of two new light weight gas turbines which have been developed as a part of their research program. One is a turbo-jet model which produces 150 lb of thrust and weighs 85 lb and the other is a turbo-prop type delivering 200 shaft hp and weighing 140 lb. By comparison, a 90 hp automobile engine weighs approximately 500 lb.

The turbo-jet engine known as model 500 is 29 in. in length by 22 in. in diam. Exhaust gases, heated to 1500°F in two burner chambers drives a 7½-in. turbine wheel. The turbine and compressor are attached to opposite ends of a common shaft.

Model 502, a turbo-prop, is basically the same as the above unit, but it has an additional turbine wheel which turns the propeller shaft through a gear box. This unit develops 200 hp and also exerts 50 lb of thrust. It is 42 in. in length by 22 in. in maximum diam. According to the company it is adaptable to aircraft or boats and has possibilities as a fixed power source for electrical generation and other industrial purposes.

Boeing's labor situation remains static with the Aeronautical Mechanics Union and management still negotiating over a new contract. Harvey Brown, international president of IMA, spent a week here with the union and the Boeing management but left without a settlement having been effected nor sanction given for the strike as was requested on May 24.

SALT LAKE CITY—Geneva steel plant, which was operating well above rated capacity before labor bill protest strikes and the coal miners' vacation prompted a 50 pct cutback, will not get back to normal operating level for about 3 weeks, according to Dr. Walther Mathesius, president. The process of getting closed units back into production was started as soon as the miners returned to their jobs early in the week.

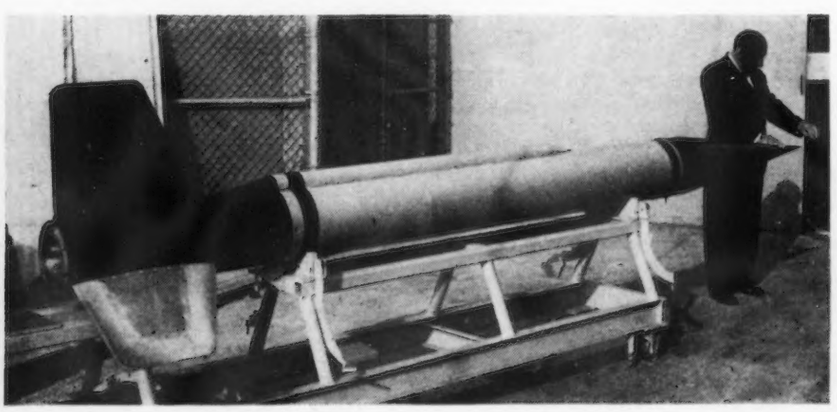
Paycheck losses of the steel workers were minimized by a staggered operation which allowed the men to take their 1-week vacation during the curtailment.

Commercial coal mines were still closed last week and apparently will remain down until the western operators sign the contract negotiated by Lewis and the northern operators. Some of the local operators are unhappy about the new contract but they have no choice now but to sign.

Wage negotiations in the nonferrous metal mine industry continue in a state of off-again-on-again uncertainty and strike action is being authorized by local after local. But neither side has yet reached the point where they are expecting a strike. The votes, all heavily affirmative, merely authorize the executive board and national wage committee of the International Union of Mine, Mill & Smelter Workers to call strikes if and when they deem that advisable.

If strike action is used it will be on a company-wide basis, according to union officials. In other words, the union leaders do not intend to strike one Kennecott operation without striking them all.

WAC-B: *Solar Aircraft Co., San Diego, builds rocket motors of light weight sheet steel for this WAC-B rocket, designed and developed by California Institute of Technology. Formerly rocket motors had been machined from castings and forgings.*



Says Rate Rise Would Magnify Discrimination

Chicago

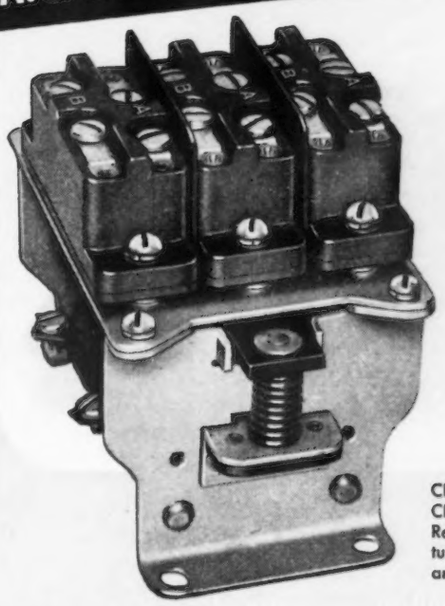
• • • **Rate increases** proposed by Railway Express Agency would magnify the existing discrimination against Chicago and other northern shipping points, A. H. Schwietert, traffic director of the Chicago Assn. of Commerce and Industry, testified before the Interstate Commerce Commission.

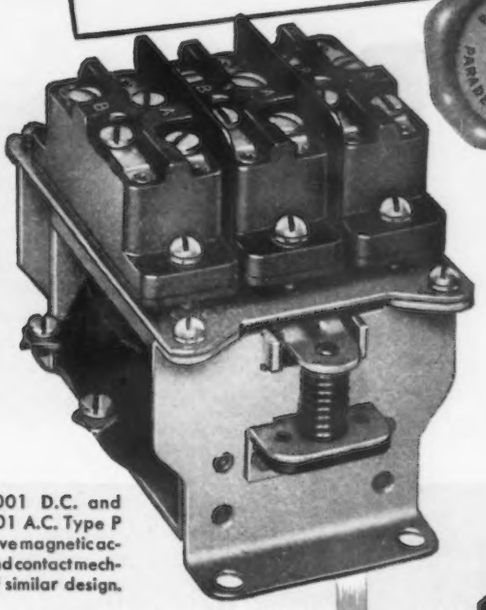
The express agency seeks authority for increased class rates, but proposes no increase in its so-called "commodity rate" structure established in 1933 in the South as an experimental attempt to regain traffic lost to trucks. As an illustration of the disparity now existing, Mr. Schwietert cited express rates of from 98¢ to $1.31 per 100 lb, from St. Louis to Cincinnati, a distance of 339 miles, whereas the present rate from Chicago to Cincinnati, a distance of 283 miles, is $2.46 per 100 lb, and the proposed rate would be $3.35.

a New Idea in A.C. and D.C. Switching Relays

Using a magnetic actuator with one or more self-contained contact mechanisms of the quick-make and break type

PART OF THE PARADE OF NEW DESIGNS





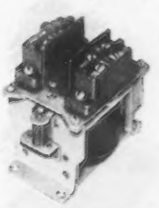
Class 7001 D.C. and Class 8501 A.C. Type P Relays have magnetic actuators and contact mechanisms of similar design.

APPLICATION • Switching relays are used to set up complicated control circuits, pilot larger magnetic devices, energize lights or audible signals, isolate low voltage circuits and occasionally to control very small motors having integral overload protection. They must be compact, inexpensive, fast, dependable, easily installed, and have comparatively low magnet coil demand.

SQUARE D's DESIGN meets those specifications. It is mounted and wired from the front, requires no extra space for electrical or mechanical clearances; consists of standard parts; has short stroke and straight line action; utilizes one, two or three individually-enclosed snap-action contacts of double-throw construction; can be readily converted to meet job requirements; and comes with either A.C. or D.C. magnetic actuators of similar design.

Flexibility is a characteristic of growing importance in the field of automatic control. Use of an A.C. or D.C. magnetic actuator of similar design with one, two or three self-contained contact mechanisms, each having one normally-open and one normally-closed contact, results in a switching relay to meet nearly all requirements. Actuators with only one contact mechanism (carried in stock) may be readily converted to additional poles by installation of either one or two additional standard contact mechanisms, also from stock. Contact mechanisms are easily and quickly renewed in the field with a minimum of expense.

1 Pole, Double throw, D.C. Class 7001 Type PO-1



2 Pole, Double throw, D.C. Class 7001 Type PO-2

3 Pole, Double throw, D.C. Class 7001 Type PO-3

Write **for complete details on Type P Switching Relays. Address SQUARE D CO., 4041 N. Richards St., Milwaukee 12, Wis.**

CONTACT RATINGS

	A.C. Voltage				D.C. Voltage		
Electrical Ratings	110	220	440	550	115	230	550
Normal Amperes	15	10	6	5	2	0.5	0.1
Inrush Amperes	40	20	10	8	...	...	...

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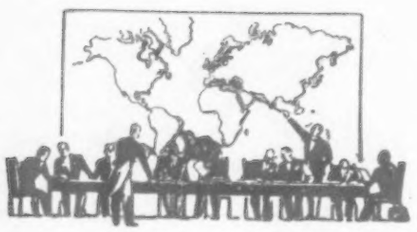
European Letter . . .

• Administering economic aid to Greece makes U. S. prime mover of Greek policy . . . People looking to guerillas as only hope against tyrannical government.



LONDON — The arrival of the American Commission in Greece to administer American economic aid under the Truman proposals has coincided with a deterioration in the Greek situation. Guerilla warfare has become more widespread. At the same time, the United Nations Commission of Inquiry into the frontier troubles has reported, with Russia and Poland abstaining, that Albania, Yugoslavia and Bulgaria have armed and assisted the Greek guerillas. The Security Council must now decide whether or not to adopt the Commission's recommendations — the negotiation of new frontier conventions and their oversight by a standing body until August 1949.

But the American delegate to the Security Council, Warren Austin, has already taken the crisis a stage further by suggesting that the Greek affair, so far considered under Article 6 of the Covenant dealing with the settlement of disputes, may have to be taken under Article 7 which is concerned with *action* to meet a breach of the peace. Such a proposal would clearly bring the Security Council face to face with an entirely new situation.

Whatever the immediate outcome of Mr. Austin's strong stand, its deeper significance is clear. Bolstering up the Greek economy, arming and training the Greek Army, championing the Greek cause in the assemblies of the world, the United States is now the prime mover in Greek policy. This point may seem too obvious to stress, but it must be stressed because of a danger into which American statesmen have fallen before and may fall again—that of conducting their policy through intermediaries, through a Darlan, or a Roxas, or a Chiang - Kai - shek, and allowing local interest, and not decisions taken at the center to determine what American policy shall be.

SUCH a course is tempting to a nation with no strong or continuous traditions in foreign policy. But, as American critics, chief among them Walter Lippmann, have not ceased to point out, it is always extremely dangerous. In the case of Greece, it is vital that the U. S. Government should be clear about its purposes and about the methods it proposes to achieve them.

First of all, there is present in Greece the possibility that a local conflict might—in Europe's present state of tension—become the lighted fuse of a great conflagration. Again many, all too many, people in Greece are not adverse to lighting the fuse. The extreme right wing, which dominates the government, greeted the announcement of the "Truman Doctrine" as a prelude to war with Russia, and politicians and newspapers announced complacently that "the atom bomb will look after Stalin."

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Finally, as the British discovered in their 3 years' connection with the Greeks, it is by no means easy to guide and influence Greek policy Traditions of honest and responsible administration are scant. The occupation and the civil war have left their legacy of intense political passions and hatreds. In 2 years, however good the intentions of the British advisory missions may have been, the quality of each successive government has declined and today the Maximos Government is certainly no advertisement for Western democracy or "Anglo-Saxon" influence.

The Americans may assume that this decline is simply due to the ineptitude of the British. They would be well advised to see what is in fact the real reason, that in spite of, not because of, British efforts, the Greek political situation has drifted out of control and that the drift will continue in the same sense: Towards further repression, more violence, more economic misery for the masses, more exploitation and corruption and, above all, a deepening risk of war—unless Mr. Marshall in Washington and Governor Griswold with his mission in Athens take over genuine control.

BUT may it not be already too late? Inside Greece "banditry" is a euphemism for the real situation which is growing to the scale of civil war. The support the guerillas receive from Greece's northern neighbors has been proved and those northern neighbors would not take action unless the Russians permitted them to do so. What can the United States do if the Russians are determined to take over Greece by Communist attack and infiltration? A fully equipped and brutally determined German army of occupation could not suppress the partisans. American military advisers have infinitely less chance.

This argument, however, assumes two factors which are by no means certain. The first is that the Russians are determined to push the frontier incidents to the point of war. The second is that the Communist guerillas have behind them the kind of popular support which the partisans enjoyed during the war. On the first point—Russian policy—there has been little in the last 2 years to suggest that the Russians seek more than nuisance value in the frontier incidents. The amount of aid given by Albania, Bulgaria and Yugoslavia has been strictly limited—enough to keep the guerillas active, not enough to organize them for a full-scale campaign. That their activities have greatly increased since the announcement of the Truman Doc-

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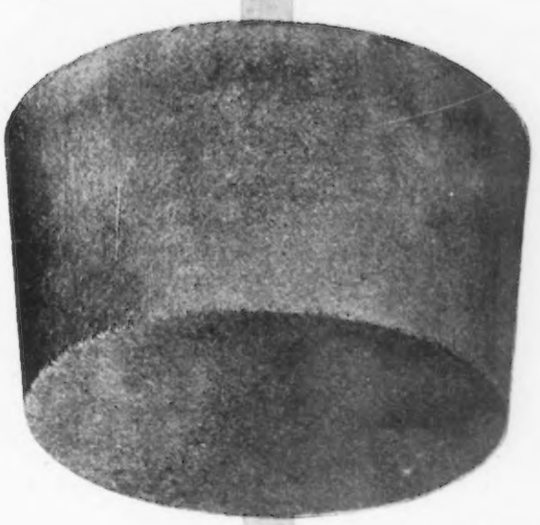

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trine can as easily be explained on defensive as on offensive grounds.

The second point—the amount of popular support enjoyed by the guerillas—is more difficult to assess. Correspondents tend to argue that it is growing. Immediately after the civil war in 1944, the excesses committed by the Communists reduced them to a small and hated minority. They hardly restored their popularity by falling in with Moscow's pan-Slavism and advocating the dismemberment of northern Greece to the benefit of Greece's Slav neighbors. Unhappily, the Greek Government, by moving steadily to the Right and rallying behind itself more and more right-wing extremists, has gradually permitted the Communists to recapture some lost support.

The kind of general radical association which EAM represented before it fell under Communist domination and which broke to pieces after the civil war is tending to reappear. Eighteen months ago, a year ago, the people of Greece were so solidly anti-Communist that they could even accept an unpopular Monarchy as a bulwark against Communism. The activities of the government police and the gendarmerie, the passage in the summer of 1946 of an emergency law suppressing most civil liberties, above all the steady deterioration in the economic situation, are reversing the position.

Once again, men and women with no Communist sympathies are beginning to look to the guerillas as their only hope against a corrupt and tyrannical government. If the trend is not reversed, the guerillas may come to have in time the kind of mass support which would make their suppression impossible. Nevertheless, the most important and most hopeful factor is that the Communists are still a small minority and can again become an intensely unpopular minority if the people of Greece are given some relief from their present discontents.

This then is the situation. Inside Greece the futility and savagery of the government have recreated a measure of popular support for the guerillas, but it is negative support, the turning to a *pis aller*. Outside Greece, the Russians and the satellites are ready to exploit this internal situation but are almost certainly unwilling to push it to the point where general war might follow.

What, then, should American policy be? Clearly, to check and play down the frontier incidents on the one hand and to work fast to reduce internal tension inside Greece on the other. In the international field the proposal to take action under Article 7 of the Covenant seems ill advised. It will expose the United Nations' inability to act and leave the Americans with the need to take some strong action—but what?

A more fruitful line would lie in strengthening and increasing the boundary commission and giving it authority to exercise a perpetual surveillance along the Greek frontier. Its establishment should precede, not follow, the negotiation of frontier conventions and it should be given all the prestige and, if necessary, the police functions necessary for its work. If the Russians refuse to accept such a body, there is no reason why the Greek Government should not invite an international commission drawn from the nations willing to cooperate to exercise roughly the same functions. Meanwhile, it is in Greece itself that the major effort of pacification should be made.

It cannot be accomplished in a day. For 2 years, Greece has drifted towards anarchy. A long and patient effort is needed to reverse the trend but at least some of the steps on the long journey have already been mapped out. In the economic field, the first task of the U. S. mission is to undo and reverse the policy introduced in February 1946.

THE Porter Report, issued after the visit of an American Economic Mission in the spring lays down the means—an end to gold sales, strict taxation, strict control of imports and exports, the diversion of capital to reconstruction, agricultural revival and industrialization, a measure of rationing and price control, budgetary stability. Six months of such a program could begin to restore the faith of the Greek masses in a more tolerable economic future and would begin to undermine the attraction of popular revolt.

But it is also vital to realize that the present government, in spite of undertaking to observe precisely this program in its note to the United States of June 15th, is almost certainly incapable of doing so. A measure of political reorganization is as essential as a new economic approach.

The Americans should make their assistance conditional upon a broadening of the government to include the Liberal opposition—with men such as Sophoulis and Sofianopoulis—and later if possible the moderate fringe of what was once EAM. A useful model might be the short-lived Sophoulis Government which in October 1945, almost managed to secure all party support. If the predominantly Populist assembly refuses, they should be offered the alternative of an American withdrawal and no loan.

These policies are perhaps less sensational and emotionally satisfying than banging on the big drum, proclaiming that Greece is "the frontier of freedom" and drifting in a flurry of fine words and ill-considered actions into a conflict which the world must seek by every means to avoid. The Americans will find no responsibility in Greece. They must take what there is with them.

They will find no policy in Greece save a mixture of sloth and violence. They must create the policy. They will get little support from either side, for both are extremists. They must create their own moderates. They must expect dislike, ingratitude and double-dealing. But surely they can find their own reward—in seeking the peace of the world and preventing one small inflamed and diseased corner of the body politic from spreading its contagion to all the rest.

Amends Trade Procedure

Washington

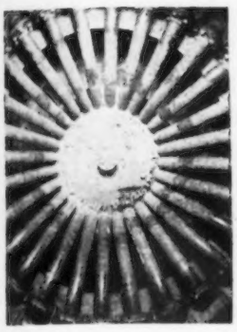
• • • **Rules of Practice** and Procedure of the Tariff Commission have been amended to include investigations of foreign trade agreements under Executive Order 9832. This order directed that all future foreign trade agreements contain a safeguard clause protecting American producers from importation in quantities that domestic output is injured or jeopardized.

Application for such investigation may be made by any interested person (in triplicate). While no specific form is required, the applicant must supply supporting information such as labor and production costs, imports, production, sales and exports. Profit and loss statements, as well as tax burdens and subsidies, must be presented.

HARPER fastening NEWS

MONEL AND STAINLESS FASTENINGS RESIST CHEMICALS IN EVAPORATOR SERVICE

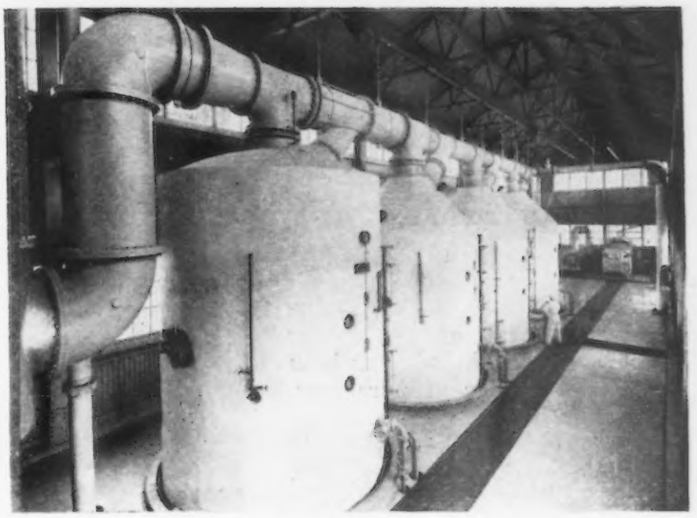
Paper Pulp, Salt, Distilling Industries Save Maintenance Cost



Pulp washer and black liquor evaporator using Harper monel bolts.

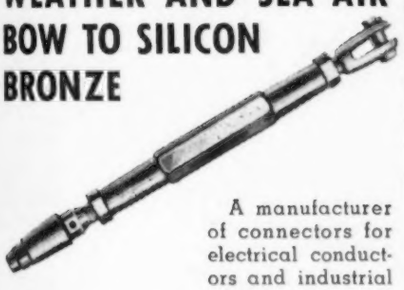
Chemicals ranging from sulphur and alkaline solutions in paper pulp manufacture to acids found in the production of rayon are handled in suitable equipments made by a large evaporator concern. This manufacturer has found that Monel and Stainless steel bolts, rivets and other fastenings, even in evaporators constructed basically of lead, reduce corrosion and provide easy disassembly and reassembly in maintenance and service.

Wherever there is handling of salt, ammonium sulphate, sulphur, alkalies, acids, distillers by-products and many others Harper non-ferrous or stainless steel fastenings can save cost and eliminate breakdown due to corrosion.

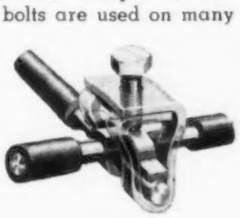


Basket type evaporators in processing of salt use Harper monel and stainless steel fastenings.

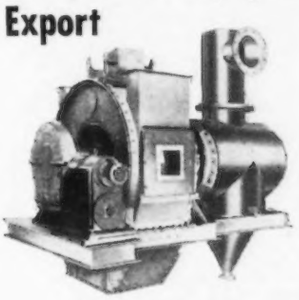
WEATHER AND SEA AIR BOW TO SILICON BRONZE



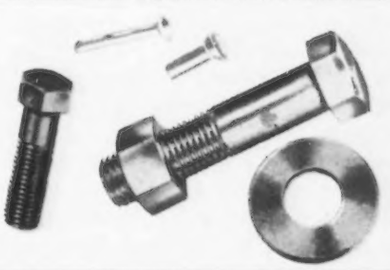
A manufacturer of connectors for electrical conductors and industrial and marine wire rope service specifies silicon bronze for resistance to "season cracking" and atmospheric corrosion. Harper Silicon Bronze nuts and bolts are used on many of these turnbuckles, tap connectors and others to promote long life and low cost maintenance.



Monel Fastenings Reduce Maintenance in Equipment for Export



Equipment manufactured for export and for use remote from servicing facilities requires extra care for prevention of breakdown and excessive maintenance. In a Top feed Vacuum type dryer recently shipped to Australia for use in the sulphate plant of a steel mill Harper Monel Metal fastenings were used to resist the chemical corrosion and promote trouble-free operation.



The H. M. HARPER COMPANY
2607 FLETCHER STREET
CHICAGO 18, ILLINOIS

Branch Offices—New York City, Philadelphia, Los Angeles, Milwaukee, Cincinnati, Dallas, Cleveland

HARPER *Chicago*

HARPER SPECIALIZES IN EVERLASTING FASTENINGS

PERSONALS

o o o

• **David T. Marvel** has been appointed manager of sales of National Tube Co.'s Ellwood City, Pa., tubing specialties division. Mr. Marvel has been manager of sales at Gary, Ind., and in his new position will be in charge of sales for both Gary and Ellwood City. He began working for Carnegie-Illinois Steel Corp. in 1927 and later was associated with tubular sales of the Timken Roller Bearing Co. He joined National Tube in 1940. **Dale R. Mason,** formerly manager of Ellwood City sales, has been named to the position of assistant to vice-president, tubing specialties division at Gary, where he will be in charge of distributor sales. He started with National Tube in 1911 and has been in charge of mechanical tubing sales for the company since 1920.

• **C. N. Rhoutsong,** assistant purchasing agent of Studebaker Corp., South Bend, Ind., has been appointed director of purchases, succeeding **P. O. Peterson,** who has been named vice-president in charge of manufacturing. Mr. Rhoutsong started as an expediter with Studebaker. **George E. Westphal,** superintendent of the machine shop, becomes general superintendent. A former Detroit machinist, Mr. Westphal joined Studebaker in 1919. He was general manager of the company's aircraft engine plant during the war. **L. R. Runkle,** formerly superintendent of the tool department, has been named master mechanic. He is a Studebaker veteran who acted as master mechanic of the aviation division during the war. **E. M. Douglas,** executive engineer, has been named vice-president of manufacturing for the Studebaker Pacific Corp. He succeeds **Stanley Whitworth,** who retired July 1.

• **Robert O. Dehlendorf,** for the past 2 years eastern district manager of the Emerson Electric Mfg. Co., has joined the sales staff of Jack & Heintz Precision Industries, Inc., Cleveland, as eastern district sales manager of the electric motor division. Mr. Dehlendorf was associated with Emerson Electric for 23 years, the first 15 in various engineering capacities, the final 8 as a key sales executive.

LEO J. McPHARLIN, assistant director of purchases, Briggs Mfg. Co.

• **Leo J. McPharlin** has been appointed assistant director of purchases for the Briggs Mfg. Co., Detroit. He has been with the Briggs organization for the past 25 years, serving most of the time as steel buyer.

• **H. W. Bartley** has been appointed director of purchases for the National Enameling & Stamping Co., Milwaukee.

• **Charles A. Kral** has been appointed assistant general superintendent, tin mill division of Jones & Laughlin Steel Corp., Aliquippa, Pa., works. Mr. Kral joined Otis Steel Co. in 1911, and was production manager when he resigned in 1925 to go with the Trumbull Steel Co. From 1927 to 1937 he worked for the Wheeling Steel Corp. as assistant general manager. He came to Jones & Laughlin in 1937 as superintendent of the tin plate department. **Howard F. Martin** has been appointed assistant general superintendent, Aliquippa works. Mr. Martin came to J&L in 1923 as electrical foreman in the open-hearth department. In 1928 he was made assistant master mechanic, master mechanic in 1930 and superintendent of maintenance in 1937.

• **Ralph W. Rausch** has been named chief engineer of the Pershing Road plant of the Link-Belt Co., Chicago. He was formerly assistant chief engineer at Pershing Road and has been associated with the organization since 1927 in various engineering capacities. Mr. Rausch succeeds **C. S. Huntington,** who has retired. **H. Walter Regensburger,** who has been assistant to the vice-president in charge of engineering at the executive offices since 1944, has been appointed divisional engineer in charge of estimate-engineering at the Pershing Road plant. He has been with the company since 1926 and from 1936 to 1944 was chief engineer at the Atlanta, Ga., plant. **Eugene P. Berg** has been appointed general superintendent of the Pershing Road plant. He has been associated with the company since 1929 and from 1945 to 1947 was works manager of the Philadelphia plant. **Joseph C. Spence** has been appointed assistant to Harold L. Hoefman, recently appointed vice-president in charge of manufacturing. Mr. Spence has been associated with the company since 1924 and was successively operating superintendent and general superintendent.

• **Oliver F. Gang** has been elected president, director and general manager of the Ludlow Valve Mfg. Co., Inc., Troy, N. Y., succeeding **Alfred W. Thompson,** who becomes chairman of the executive committee and continues as treasurer of the company. Mr. Gang comes to Ludlow from the William Powell Co., Cincinnati and New York, from which he resigned on June 30 as vice-president and consulting engineer. From 1919 to 1931 he was sales engineer for the Lunkenheimer Co. Mr. Thompson joined the Ludlow company in 1935 as vice-president and succeeded Livingston W. Houston as president in 1939.

• **Sidney W. Taylor,** adviser engineer for Portland, Ore., has been appointed general manager of the recently purchased Kaiser-Frazer foundry at Dowagiac, Mich. **Clifford Hockman** has been named works manager.

• **Louis O. Klingelhofer,** vice-president and general manager of Pittsburgh Bridge & Iron Works, Rochester, Pa., has been appointed executive vice-president. **Donald B. Newton** has been appointed general manager. Mr. Newton was formerly with the Dravo Corp.

• **Philip G. Boyd** has been appointed assistant district sales manager of the Chicago area for the Youngstown Sheet & Tube Co., Youngstown. Mr. Boyd has been district sales manager for the company at Washington for 6 years. He joined the company in the Detroit district sales offices in 1929.

• **Walter Carlson** has been appointed assistant sales manager of the truck body and hoist division of the Heil Co., Milwaukee. **John Zimmerman** has been made sales representative for Heil in Wisconsin, Michigan, Illinois, Indiana, Ohio and Kentucky.

• **Raymond R. Rausch** has been named as a consultant to the General Electric Co., Schenectady, on manufacturing matters. Mr. Rausch was associated for many years with the Ford Motor Co., at one time having been president of the Henry Ford Trade School and a member of the company's board of directors. Before joining the Ford organization he was general superintendent of the Timken Detroit Axle Co. Mr. Rausch will serve as a member of the manufacturing group on the staff of C. E. Wilson, GE president. His headquarters will be in New York.

• **L. A. Forrest** has been appointed general purchasing agent of National Pressure Cooker Co., Eau Claire, Wis., and Martin Motors Div. of National Pressure Cooker Co., Eau Claire, Wis.

• **F. J. Rudd,** managing engineer of the General Electric Co.'s motor engineering division at Lynn, Mass., has retired from the company after 46 years of service.

E. C. WRIGHT, head of metallurgical engineering dept., University of Alabama.

COL. FRANK J. ATWOOD, vice-president, Remington Rand, Inc.

• **E. C. Wright** has resigned as assistant to president of the National Tube Co., Pittsburgh, to become head of the metallurgical engineering dept. of the University of Alabama at Tuscaloosa, Ala. Mr. Wright was on the staff of the National Tube Co. for 21 years, serving for 10 years as chief metallurgist of the Ellwood City plant, 7 years as chief metallurgist in the Pittsburgh office and the last 4 years as assistant to president.

• **Louis F. Demmler** has been elected president of the Demmler Bros. Co., Pittsburgh, succeeding **Otto H. Demmler,** who has retired. Louis Demmler was formerly director of research and merchandising for Ketchum, MacLeod & Grove, Inc., Pittsburgh advertising agency. He was previously connected with Demmler Bros. Co., from 1931 until 1939 when he joined the advertising firm. Otto H. Demmler, who has been associated with the firm for the past 59 years, will continue on the board of directors and will serve as consultant to the company's new management.

• **Eldon E. Libby** has joined the Southern States Iron Roofing Co., Savannah, Ga., as merchandising manager. Mr. Libby was formerly with W. H. Schatz Industries, Inc., Chicago, where he was vice-president in charge of sales and promotion.

• **Col. Frank J. Atwood** has been named a vice-president of Remington Rand, Inc., Buffalo. Colonel Atwood will continue in his present capacity as director of procurement, inventory control and traffic.

• **Ralph L. Benson** has been named to head the refrigeration and appliance section of the research and advance development department of the Crosley Div.-Avco Mfg. Corp., Detroit. Mr. Benson, except for recent short terms with the Universal Cooler Div. of International Detrola Corp. and the Liquid Carbonic Corp., was formerly chief engineer of the refrigerator section of the special engineering division of the Aviation Corp., Detroit, now the Avco Mfg. Corp. Prior to that he was in charge of compressor and refrigerating unit engineering for 7 years with the Gibson Refrigerator Corp., Greenville, Mich. Prior to that he was a research and development engineer for 4 years with the Kelvinator Corp., Detroit.

• **E. C. Koster** has been elected president and general manager of Vlchek Tool Co., Cleveland. Mr. Koster has been vice-president and general manager of Vlchek since 1941. He joined the company in 1914 and was made a director in 1924.

• **Raymond L. Gillispie,** consultant to the rail and track accessories division, sales department, Bethlehem Steel Co., Bethlehem, has retired. Mr. Gillispie has been connected for 37 years with the manufacture and sale of railway products. When Bethlehem acquired Pennsylvania Steel in 1916, he was made assistant superintendent of the frog and switch shop at Steelton, and in 1927 he became superintendent. In 1934 he was transferred to Bethlehem as manager of sales, track accessories, railroad specialties, and railroad and mine cars, which position he held until February of this year. Since that time he has been consultant to the rail and track accessories division.

• **Dr. R. M. Zabel** has been appointed to the executive engineering staff of the Westinghouse Electric Corp. Lamp Div., Bloomfield, N. J. Dr. Zabel, who since 1936 has been chief engineer of the Lamp Div. of Sylvania Electric Products, Inc., has been named staff assistant to Dr. A. M. Hageman, manager of engineering for the Westinghouse Lamp Div.

• **O. A. Schilling** has been named eastern sales manager of the mechanical goods division of the Goodyear Tire & Rubber Co., Akron, Ohio, succeeding **H. D. Foster,** who was recently appointed manager of the mechanical goods division. Mr. Schilling was formerly district manager of mechanical goods at Dallas. He has been associated with Goodyear since 1939.

• **A. B. Nauert,** assistant division sales manager of the southern division of Columbia Steel Co., San Francisco, has retired after 44 years of service with the U. S. Steel Corp. Mr. Nauert started with the American Steel & Wire Co. in San Francisco as a clerk in 1903. He left the wire company in 1911 to become a salesman for the U. S. Steel Products Co. In 1930 he transferred to the sales department of Columbia Steel Co.

• **Ben J. Feingold** has been appointed a representative of Max Schlossberg Co., Chicago.

JOSEPH J. MAYER, vice-president and director, Lumen Bearing Co.

• **Joseph J. Mayer** has been elected vice-president and a director of the Lumen Bearing Co., Buffalo, to succeed the late C. H. Bierbaum. Mr. Mayer will continue to serve as general superintendent.

• **Howard T. Saperston** has been elected president of the Smith-Victory Corp., Buffalo, succeeding Mrs. Roy S. Bain. **John D. Jones,** comptroller, has been elected a director and vice-president, and **Richard H. Wile,** secretary.

• **Fred W. Sparks** has joined the Buda Co., Harvey, Ill., as district representative. He was formerly with the Euclid Road Machinery Co., Cleveland, as a representative.

• **Walker G. White** and **Harry W. Tenney** have been appointed operating managers of the Westinghouse Electric Corp.'s elevator division, Jersey City, N. J. Both men have been with Westinghouse more than 25 years. Mr. White was appointed general manager of contracting operations, with direct responsibility for sales, service and construction, including supervision of the division's district offices. Mr. Tenney was appointed general manager of manufacturing operations, with direct responsibility for engineering and manufacturing, including related functions such as purchasing and industrial relations.

• **J. H. Glass** has been appointed plant manager of the Chevrolet commercial body division in Indianapolis. **James H. Wechsler** has been promoted from plant superintendent to assistant plant manager. Mr. Glass was formerly master mechanic of the plant and succeeds **Earle W. Pughe,** resigned. **E. L. Harrig** has been named general service manager for Chevrolet Motor Div. of General Motors. He has been assistant national manager of the service and mechanical department in Chevrolet's central office since 1937.

OBITUARY...

• **Joseph Hruby,** 75, formerly manager of the Detroit office of Wyandotte Chemicals Corp., died July 2.

• **John E. Gosline,** one of the founders of the Beloit, Wis. Foundry Co., died June 27. He was with Fairbanks, Morse & Co. before organizing the foundry firm.

• **Emil E. Sims,** 43, assistant branch manager for International Harvester Co., Milwaukee works, died June 24.

• **Oliver N. Hollis,** 51, mechanical engineer with the Stone & Webster Engineering Corp., Boston, died recently.

• **Paul W. Armstrong,** vice-president of the Mississippi Valley Structural Steel Co., St. Louis, died on July 1. He joined the steel fabricating company at its home plant almost 40 years ago. He was works manager of the St. Louis plant from 1923 to 1927.

• **Alvah F. Dole,** 71, retired estimating engineer for the Worthington Pump & Machinery Co., East Cambridge, Mass., with whom he was associated 50 years, died July 1.

FAIRBANKS MORSE
POMONA PUMPS
SALES
SERVICE
WHAT MAKES A GOOD PUMP DEALER?
A pump dealer is as good as the line he sells, and the facilities he maintains for servicing his customers' pumps.
You look to a good dealer for a broad line of pumps—with so many types and sizes that he can give you unprejudiced advice . . .
You look to a good dealer for the benefits of a service organization that's ready and able to solve your pumping problems at the drop of a hat . . .
That's why so many pump buyers think of their Fairbanks-Morse dealers as the best in the business.
F-M Rotary Pumps: Simple, low cost units for general, wide application. Sizes from 3/8" to 5"
F-M Pomona Deepwell Turbines: Oil or water-lubricated; with open or closed impellers, as your job requires
F-M Propeller Pumps: For large capacity low head service
FAIRBANKS-MORSE
A name worth remembering
DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES • MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS

Dear Editor:

BRITISH CONCURRENCE

Sir:

One British reader of the editorial in the May 29 issue, entitled "The One-Way Dollar" welcomes your effort to have peoples of the English speaking world understand some simple and inescapable economic facts. It seems to some of us here a most strange thing that in the U. S. there should be such a desire to hold to tariff walls. We hear on every side how efficient American industry is. We are told of the low costs which are made possible by large scale and scientific production methods. It is explained how in spite of this there is a high standard of living in the country, and it is argued that a high standard of living and production on the American scale go hand in hand. Along with this it is pointed out to us, not necessarily by the same people, how comparatively inefficient we are on this side of the Atlantic; how high are our costs; how poor our output per manhour. In face of this what can be the possible need for the U. S. to maintain a tariff wall? What possible hope is there that British, French and Belgian exporters can get their goods into the American market against such high standards of efficiency and low costs of production?

So strange and illogical does the retention of tariff walls appear to be that some of us are beginning to ask whether it is quite true that American efficiency is what we are told. Are the tariff walls necessary because all this talk of very high efficiency and low costs is an unreliable facade? Would American industrial production be unable to withstand equal competition from the old countries?

We are faced then with a simple question; either American industrial production is just as inefficient as European production is said to be, or else there is no logical reason for the retention of tariff walls against imports to America. I believe you know the answer, and that the editorial shows that you know it.

F. A. MARTIN

Clyde Steel Works
Sheffield, England

CONTACT ARCWELDING

Sir:

I am interested in the new contact welding method on which your magazine has recently published articles. Although not writing in the capacity of such, I am a welding and metallurgy instructor in the Marine Corps Institute and have been reading articles in your magazine that pertain to my course. Would it be possible for me to be sent the article, "Contact Arcwelding," that was in the Dec. 12, 1946, issue, and the more recent article, "Penetration and Welding Speed in Contact Arcwelding," in the May 29 issue.

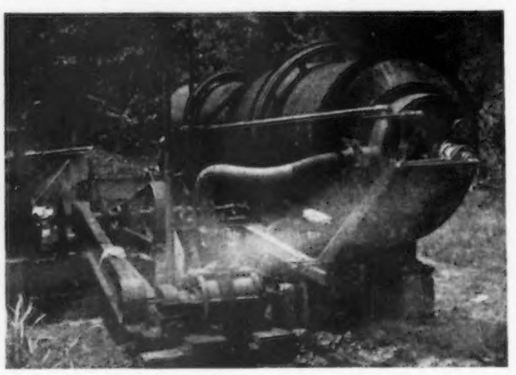
WALTER C. NOAKES
Pfc., U. S. M. C.

MCI Technical School, MB
Washington

IRON MELTING

Sir:

This is a rotating furnace that uses coke for fuel and melts iron! It works, strange to say, and indeed better than expected. It was gotten up to melt "sponge iron" (if any), borings, turnings and waste iron



generally. Collateral experiments by the U. S. Bureau of Mines seem to indicate the smelting of iron ore as a probability in the future. The furnace is capable of developing very high temperature reducing conditions without the necessity of heated blast, due to the fact that the combustion conditions are similar to those of the cupola furnace, or boiler furnace. The furnace was operated several hours on each of four days and was very spectacular. I bring this to your attention for just whatever it is worth.

J. D. RUSSELL, M.E.
Consulting Mechanical Engineer
Anniston, Ala.

BIKINI

Sir:

We are very much interested in obtaining the article, "Fission at Bikini" which we understand appeared in the June 13, 1946 issue.

G. FORD

National Lead Co.
South Amboy, N. J.

SHEARING MACHINES

Sir:

We would be grateful if you could recommend to us any manufacturers of steel sheet shears, particularly any that would manufacture shears cutting up to a width of 60 in. and a thickness of ¾ in.

STEVEN AUSNIT
Secretary
Occidental Trading & Investing Corp.
New York

● A list of some of the larger manufacturers of this type of equipment is being forwarded.—Ed.

CHINESE TUNGSTEN

Sir:

Will you please forward 6 copies of the article which was in the June 26 issue, "Russia Dominates Chinese Tungsten Market as Lone Customer."

T. R. COYLE
Purchasing Agent
Sylvania Electric Products Inc.
Towanda, Pa.

SUITABLE FINISH NEEDED

Sir:

We are manufacturers of hand trucks and at present are dip painting them. We are not at all satisfied as the paint chips and comes off in transit. The frame of the trucks are made of cold-rolled welded tubing. The surface of this type of tubing is so smooth that the lacquer will not stick. The rest of the truck is made of hot-rolled flats. This has some scale on it. Hand trucks receive a good deal of abuse and no matter how good the paint it will come off in a short time. We would like to know about the possibilities of putting a finish on similar to oxidizing. Some color other than black is preferred; something that will keep the truck from rusting and cover the blue caused by electric welding. The cost of such a finish is of great importance. Any information you can send us on this will be greatly appreciated.

H. N. COURSEN
Coursen & Sommer Mfg. Co.
Chicago

● Tear sheets of metal finishing articles describing various coloring methods are being forwarded which we believe may help in solving your problem. Costs could best be followed up after satisfactory methods of coloring are decided upon.—Ed.

TINY ELECTRIC MOTOR

Sir:

In your June 19 issue, in Newsfront, you mention a tiny electric motor being made in England, the smallest of which weighs 1/28 oz and runs at 7000 rpm. Will you please send us the name and address of the manufacturer?

WADE BUTTON CO. INC.
Boston

● The motors are manufactured by Rev-Motors, Bolton, England. Further details can be found in the July 10 issue, p. 63.—Ed.

They don't pay off on DEADWEIGHT

When frame, body panels, fenders, wheels and other structural parts are made of N-A-X HIGH-TENSILE, a truck uses its horsepower to deliver goods, not deadweight. The high physical properties of N-A-X HIGH-TENSILE make possible weight savings up to 25% in section, yet maintain superior strength and have increased resistance to fatigue, corrosion, abrasion and denting.

On the job, the savings in pounds mean a savings in dollars. Gasoline economy is improved. Maintenance costs are reduced. Life factor is increased.

If you make a product that moves, it will move more efficiently and economically through the application of N-A-X HIGH-TENSILE. Good formability, excellent weldability and fine surface texture for finishing make N-A-X HIGH-TENSILE a great steel to work with, too.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

GREAT LAKES STEEL CORPORATION
N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION

Industrial News Summary...

- ***Inflation Strikes Scrap Markets***
- ***Prices Up Sharply in All Areas***
- ***Steel Production Regains Ground***

HOPE that President Truman's plea for a stay in the rise of steel prices would be effective received a severe jolt this week when the price of steel scrap zoomed at all major markets. THE IRON AGE scrap composite price this week for No. 1 heavy melting steel was only $1.92 a ton below the all-time high reached in the week of Mar. 18 of this year. The composite price of this week went from $35.58 a gross ton to $37.75 a gross ton, a jump of $2.17 a ton.

The average price of scrap this week is 54¢ a ton above the previous record made in June 1917 when the average price reached $37.21 a gross ton. More significant, and causing the steel industry considerable anxiety when viewing its operating costs, is the fact that the average price of scrap today in the three major consuming centers, Pittsburgh, Chicago and Philadelphia, is already $8.25 above the low for 1947 reached around the middle of May. Practically all of this increase has accumulated since the steel contract was signed earlier this year.

Statements from Washington attacking the contemplated action towards higher steel prices appear to "blithely" pass over some of the more serious problems in steelmaking costs facing the industry. In recent months the trend in steel earnings has been down. Second quarter reports due within the next few weeks will show that second quarter earnings were off from the unusual first quarter experience.

Higher freight absorptions, an inflationary scrap market, scarcity of coke, much higher coal mining costs and dissipation of prime raw materials during the war period, are only a few of the problems with which the industry wrestled in considering the necessity for higher selling prices.

IT was not known this week just what practical effect the White House plea on prices would have. The industry is between the "devil and the deep blue sea." If upward adjustments are not made, earnings will fall off and some companies claim investors will not supply the money needed to further modernize and expand steel capacity. Labor rates both in steel and coal are fixed for the life of the contracts, but steel prices are subject at all times to the demand or lack of demand for steel products. Steel firms are also confronted by increased costs as the steel operating rate recedes from record levels.

There are some in the steel industry who early this week were privately voicing the opinion that the scrap price rise made necessary an increase in steel prices of more than an average $5 a ton. It is unlikely, however, that any steel company would be willing to face public opinion and governmental censure by naming unusually high steel prices in the near future. The U. S. Steel Corp. is still expected to take the lead in posting new steel quotations. It can be expected, on the basis of its conservative record and the knowledge that its action definitely influences the industry, that the price increases which it is expected to announce will be backed up factually by studies indicating specific increased costs in steelmaking.

The White House statement burst in the middle of last-minute checking and rechecking on the tentative advances to be made in various products. Unless a most unusual and unprecedented circumstance prevents it, major steel products will be revised upward in the near future. Some firms this week have come to the conclusion that their steelmaking costs with the new coal price included are up from $4 to $5 a ton over a few months ago. Estimates on the increased costs of steelmaking because of the coal contract alone are not uniform. This is not unusual considering the fact that some companies must go to great expense in blending and washing their coal.

STEEL demand this week continued high and although there were rumblings under the surface that cancellations and deferments might be on the increase, the volume of steel affected by such action was not large compared to total orders. In practically all cases incoming business exceeded shipments.

The steel ingot output this week came within striking distance of the level preceding the coal vacation shutdown. Operations advanced 8 points this week to 92 pct of capacity and by the end of the week all companies should be making steel at the level prevailing a few weeks ago. There is nothing to prevent a substained high operating rate continuing for the next 6 months at least. Many sources in the industry see near capacity operations until the second quarter of 1948.

Foundries and nonintegrated steel companies were paying higher coke prices this week. Average quotations on foundry beehive coke were up $2.25 a ton and the increase in furnace beehive coke averaged $1.50 a ton. Byproduct coke makers in many instances have posted increases and others are expected to do so this week. Commercial coal prices in the Western Pennsylvania area are already up $1.20 a ton and increases are expected in other areas.

Sloss-Sheffield Steel & Iron Co., Birmingham, has announced a pig iron price increase effective July 15 of $3.50 per ton. Other Birmingham producers had not yet announced increases at press time. If other producers make increases effective July 15, pig iron price quotations will be corrected retroactively in the next issue. Most steel companies lack coke for pig iron output and must temporarily depend on higher scrap charges.

• **RAIL RATES**—Acting on the Supreme Court's decision of May 12 which upheld its 1945 order in the interterritorial class-rate case, the ICC has ordered the nation's railroads to increase class rates in the North and East by 10 pct and to reduce the rates by the same amount in the South and West. These adjustments are to be made on the rates in effect before the ICC's order of last Jan. 1. This order increased class rates in the East by 25 pct, and 20 pct in the South and West. The new ICC order threw out the increases of Jan. 1, and in lieu of them substituted a uniform increase of 22½ pct. Therefore the effect of the Commission's decision was to increase present class rates approximately 9 pct in the East and decreasing them in the other territories by about 10 pct.

• **WEEKLY EARNINGS**—Average weekly earnings in manufacturing industries in May were at an all-time high of $48.86, appreciably above the wartime peak, according to the Bureau of Labor Statistics. A slight extension of the work-week in iron and steel brought the average weekly earnings for that group to $51.80, the report showed. While the highest hourly rates continue to be paid foundry and rolling mill workers, makers of gray iron and semisteel castings drew the highest take-home pay ($54.57) by reason of a slightly longer work-week. On the other hand, both anthracite and bituminous mining showed a decline in both hours and weekly earnings in April. This was attributed to holidays and other work stoppages such as the safety shutdown. However, the anthracite worker averaged $49.89 weekly and the bituminous miner, $54.77. Ore miners drew about the same.

• **BRITISH OUTPUT**—June steel production in the United Kingdom showed further substantial recovery from the fuel crisis in February and March. The weekly average output during June totaled 254,000 long tons, equal to an annual rate of 13.6 million long tons. This compares with a weekly average of 243,900 in May. The production for the second quarter of the year was at the annual rate of 12.69 million long tons, compared with 11.23 in the disastrous first quarter. The weekend operating agreement is giving a boost to the operating rate, but the British Iron & Steel Federation warns that pig iron stocks are being depleted by present operations. Offers for export shipments of British pig iron are still being received in the Boston area.

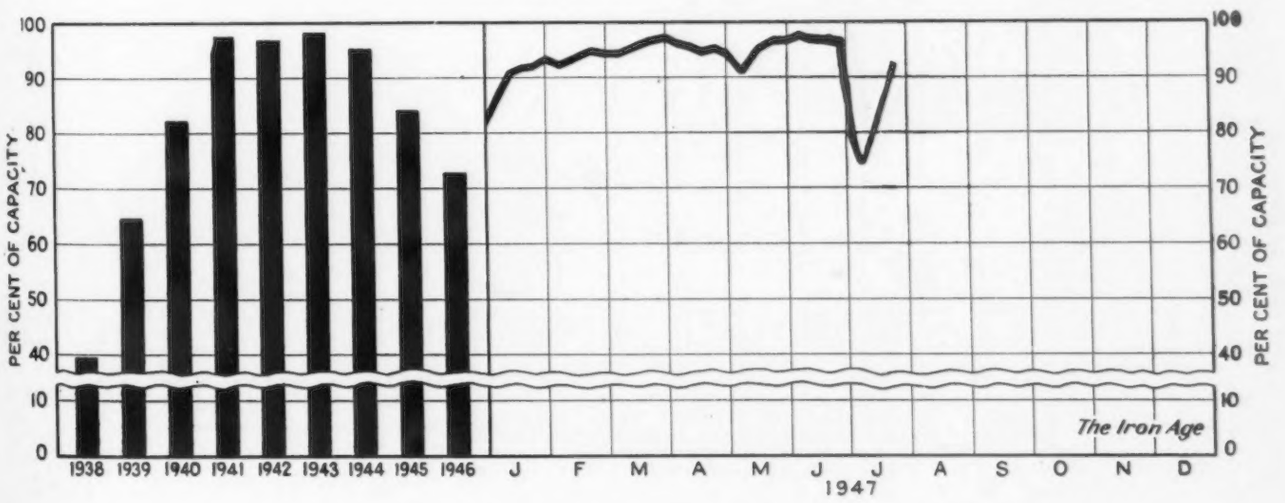
• **STEEL OUTPUT**—The 42,267,320 net tons of steel made in the first half of 1947 was almost 15,000,000 tons larger than the amount made in the comparable part of 1946, and was almost double the production of the first half of 1939 says the American Iron & Steel Institute. For 25 consecutive weeks beginning at the start of 1947, operations were maintained between 90 and 97 pct of capacity. The average for the full 6 months was 93.4 pct of capacity. In June, output totaled 6,952,216 net tons, with facilities operated at an average rate of 92.6 pct of capacity. In the May 1947 record month, output totaled 7,329,497 tons (revised) of steel and ingots for castings and operations averaged 94.5 pct of capacity. The June decline was largely due to the influence or reduced operations in the coal mines.

• **PORTSMOUTH EARNINGS**—Cyrus Eaton's Portsmouth Steel Corp. has reported that net sales set a new high of $12,897,715 for the quarter ended June 30. Net earnings for the quarter, after all charges, also reached the record figure of $1,024,359 equal to 77¢ a share on the 1,327,500 shares outstanding. Although Portsmouth's fiscal year ended Dec. 31, the interim report to shareholders includes a consolidated income statement for Portsmouths' first 12 months of operation, showing net earnings, after all charges, of $3,194,559, or $2.41 a share. Portsmouth, with an excess capacity of coke, is currently shipping coke to more than 75 customers.

• **TRUCK OUTPUT**—A new all-time record for new truck registrations was established in April, according to R. L. Polk & Co., when registrations hit 85,148 units. The April showing exceeded by nearly 6000 units the previous record established in March of this year. April production was more than twice that of April 1946 according to Polk registration figures. May is expected to continue at nearly record level. Registrations from 31 states indicate that the total for the month will exceed 80,000 units. Polk statisticians have estimated that new passenger car registrations for May will exceed 325,000 units.

• **RETAIL CREDIT**—The volume of retail credit reached a new high during the month of May, increasing $250 million during the month and bringing the total to $10,664,000,000, the Federal Reserve Board has reported. Total consumer credit is now approximately $550 million higher than the prewar peak achieved just before Pearl Harbor.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
July 8	94.0*	93.0*	75.0*	93.0	82.0	102.0	75.0	99.0	101.0	87.0	98.0	84.0	87.0	84.0
July 15	100.5	90.0	84.5	95.0	93.0	104.0	80.0	99.0	101.0	94.0	98.0	82.0	93.0	92.0

* Revised.

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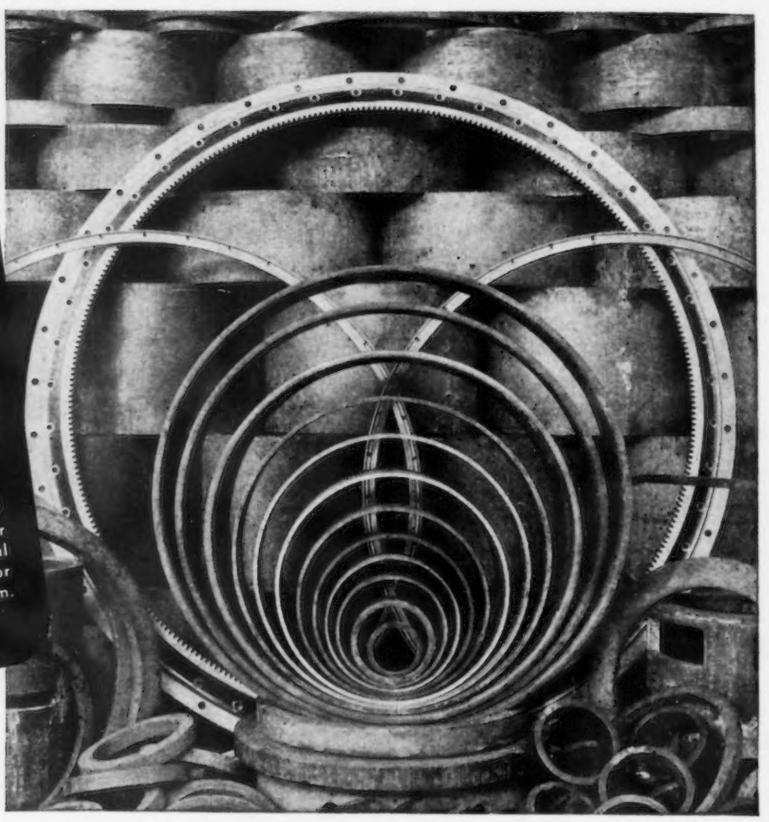

THE AMERICAN WELDING & MANUFACTURING CO. • WARREN, OHIO

European Aid Program Would Boom American Steel Rate Next Year

New York

• • • **Congressional approval** of a broad European aid program would have a pronounced effect on the operating rate in the American steel industry next year. Conservative observers here have estimated that after the seller's market in this country has passed, the steel industry would cut its operations to 70 to 80 pct of existing capacity, but the development of a comprehensive Marshall plan may mean that Western Europe will call for an unprecedented 7 to 9 million tons of American steel next year.

Historically Europe has not been a large market for American steel, but the accumulation of demand through the war years, plus the retarded reconstruction of most European countries has left the Continent in a position where only America can ship the large tonnages of steel required to fill pipelines and set the wheels of industry in motion.

The large unfilled demands for steel from Britain which have been previously reported (See THE IRON AGE Oct. 24, 1946, p. 94, and June 19, 1947, p. 108) are only a slight indication of the requirements which can be expected if a flow of dollar credits is extended to help the European countries out of their exchange difficulties. Similar, though smaller demands for American steel can be reliably expected from France, Italy, Norway, Sweden, Denmark, the Netherlands and Switzerland. If an aid program can be developed which would include the eastern European countries, then several other countries can be added to the list.

From the standpoint of the overall steel requirements of Europe, Germany remains the biggest question mark. In the past year and a half, everyone concerned themselves with the future steel industry of Europe has taken the stand that until the peace treaty was signed with Germany, no decisions could be made. If an integrated plan is drawn up for the Western European economy, one of its fundamental pillars will be a realistic estimate of steel production in Germany.

Broad Program Would Call For 7 to 9 Million Tons Of Our Steel in '48

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By JACK R. HIGHT
Associate Editor

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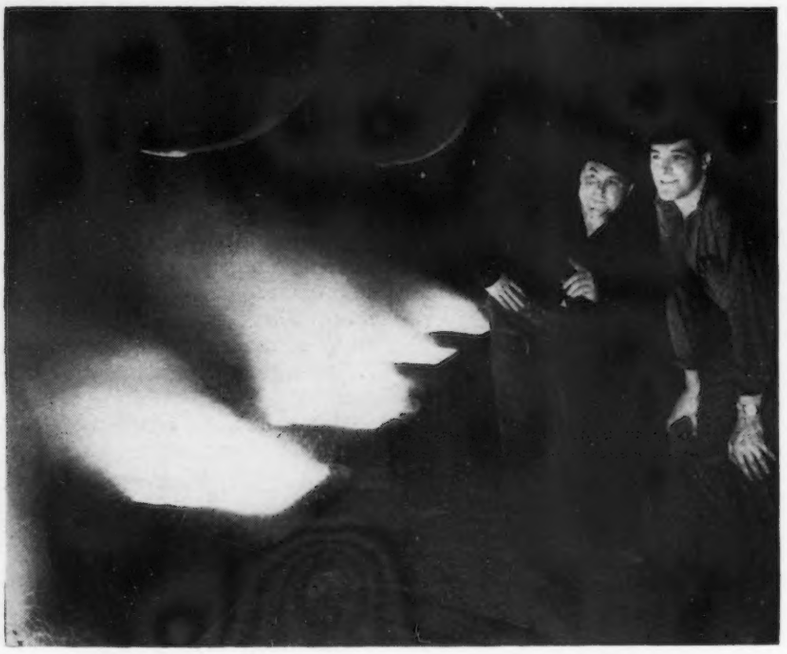
In prewar years the industrial economies of all the continental countries revolved about the steel output of the Ruhr. This year, despite a potential capacity of at least 12 million metric tons, the German industry in the British zone will probably produce only 2 to 3 million metric tons of steel.

There is considerable evidence that arrangements are being made to remove the existing 5.8 million ton limit on German production, but this limitation at the moment is having little effect on German output. The ceiling may be lifted immediately but it will take substantially greater coal allocations plus a more stable currency in Germany to get steel production up.

German steel demands, under the prevailing system, are apt to take a back seat to the Anglo-American desire to put the occupation of Germany on a paying basis. Thus, although German officials estimate that they need 14 million tons of steel each year for a reasonable reconstruction program, it is probable that occupation authorities will direct some tonnages of German steel for export long before production gets

The 1948 Scene



BESSEMER PARADOX: *In the bessemer-less Homestead plant of Carnegie-Illinois Steel Corp., English-born Alan Bessemer, great nephew of the converter inventor is studying steelmaking this summer. Sir Henry's great nephew is at the right, his attention being caught by Michael Getsy, a steel pourer.*

that high in Germany. It may even be that some barter deals may be worked out next year which will permit some German steel exports.

To summarize the German situation, there is the possibility that the German industry may make some contribution to the overall European steel shortage, at least the potential is certainly there. It seems probable, however, that the political difficulties connected with rehabilitating the country, combined with the pressure for coal shipments from Germany will prevent substantial exports. Thus the prewar No. 1 European steel exporting country is out of the picture.

There are British steel industry sources who would like to see shipments of low-priced German semifinished steel arriving in Britain as soon as possible, but no specific plan has been drawn up to achieve this end. The possibility of the establishment of some new kind of lend-lease which would make American raw steel freely available to British mills might be just the substitute required for cheap German steel.

Last year the British purchasing agents in this country were asking for 2 million tons of steel. This year when they canvassed American mills they were only searching for 1.25 million tons, but the British demand has not actually been reduced. Both those estimates of requirements were based on estimates of the future availability of American steel, plus the serious depletion of the British dollar loan.

Unfortunately, estimates of actual steel demand in Britain since the war are not too reliable. But there is no doubt among responsible British officials that there is a long-term as well as short-term need for substantial tonnages of American steel in Britain. The United Kingdom's own steel exports have been pared to the bone, but with the serious drop in production early this year and the prospect of a similar drop in the first quarter of next year, there is still a serious shortage for domestic users in Britain.

Observers close to the scene estimate that Britain can absorb at least 3 million tons of American steel during the next 12 months, and may ask for even more. Of the 3 million tons, British sources will prefer that about 2 million be shipped in the form of semifinished steel, while the balance will be in the form of finished steel products.

The French steel industry will be more anxious to get a maximum of finished steel shipments, as French rolling capacity is badly in need of expansion and modernization. The Monnet plan outlined the expansion of the French industry that is to take place, but this development will produce little extra steel during the next 12-month period. French purchasing policy in the United States since the end of the war has emphasized the importance of buying finished machinery, although the United States exported 390,000 tons of steel products to France last year.

Continuing fuel shortages and labor difficulties have kept French production below the levels specified in the Monnet plan, with the result that French demands under an American aid program for Europe will be high. Industry sources have estimated that heavy imports of manufactured goods will make up some of the shortage, but that about 2.5 million tons of finished steel products may be requested by France.

Including those countries which are most commonly assumed to be possible recipients of American aid, estimates made here indicate a possible total demand for 6,450,000 to 8,380,000 ingot tons of American steel during the next 12 months. This figure, in thousands of ingot tons, including high and low estimates is made up as follows:

	Low	High
Great Britain	2,900	3,450
France	2,500	3,000
Italy	350	600
Austria	75	100
Greece	75	100
Netherlands	350	490
Norway	200	220
Sweden	770	950
Switzerland	200	310
Denmark	250	275
Eire	30	45
Total	7,700	9,540

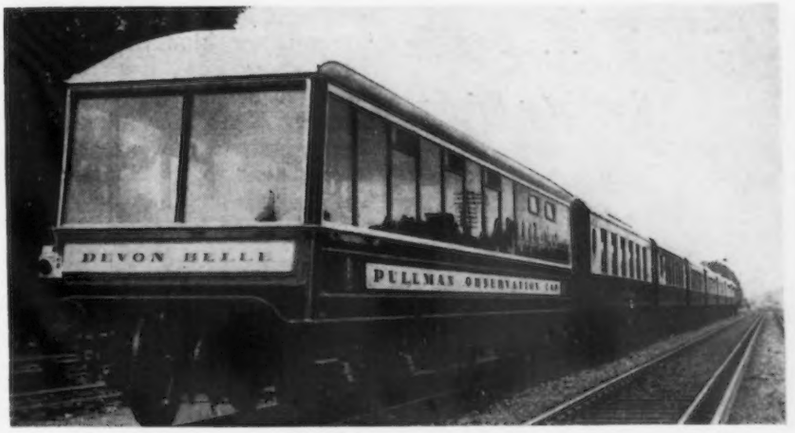
If such Russian influenced countries as Rumania, Yugoslavia, Bulgaria, Finland and Hungary are included, the total estimate goes up another 750,000 tons. No estimates are available if it should develop that Russia itself is included in the aid program.

The probability of any such heavy deliveries of steel products being arranged in present circumstances, depends heavily upon government action in continuing export controls. If a Marshall program were approved in the near future, in light of the steel shortage, it would be futile for the U. S. government to attempt such a program without directing ex-

ports. If the program is not completed until next year, then it may be possible that the shipments for Europe will start approximately at the point when the seller's market in steel is ending in the United States. State Dept. officials are known to be studying a method of directing steel exports at the present time.

It seems logical that if the State Dept. is to take a hand in ordering American steel companies to export additional tonnages to Europe, everything should be done in Europe to see that the maximum benefit will be obtained from the industry there. The difficulties already mentioned will make it difficult to achieve the maximum potential from the German industry without building up a powerful industrial Germany again. When the best possible compromise has been reached in the case of Germany, some problem with Belgo-Luxemburg steel exports would remain.

Belgium and Luxemburg have been exporting steel as heavily as possible, to several countries in Europe, and also to other nations. If a master plan were drawn up to get as much steel as possible to Europe, it would probably imply doing so as efficiently as possible in the light of politics. To get Belgo-Luxemburg sources to give up their lucrative business in South America in order to ship to poverty-stricken European neighbors will require negotiations changing the entire world steel distributive pattern. Thus the American Government, in developing an aid program may find itself "organizing" the world steel market, just as the prewar international steel cartel did.



NO STONES FROM HERE: *British train designers are taking the postwar streamlining fanaticism with customary diffidence. The observation car of the newest holiday train running to the southwest of England features wide windows and clean, chopped-out-by-a-meat-cleaver lines.*

French Ore Mines Report Heavy Losses On All Operations

Paris

• • • **According to a** report from French ore mines total production during last year amounted to only 16 million tons, compared with 50 million during 1929. Deliveries of ore during the year amounted to about one-fourth of the 1929 total, and equal to about 40 pct of the 1938 figure. French ore exports during last year to Belgium and Luxemburg reached about 50 pct of the prewar period.

The change in the ore consumption pattern in Belgium and Luxemburg is a source of concern to French officials. Belgian blast furnaces are now consuming about 33 pct French ore, while before the war the proportion was nearer 65 pct. The Belgian desire to increase its consumption of high grade ore (Swedish) in order to economize on coke, poor handling of the French government directed steel program, and the necessity for Belgium to barter with Sweden have all contributed to the change.

Due to the slow recovery of the French iron and steel industry the ore mines have been compelled to work at far below capacity. The financial position of the ore companies reflects the low level of operations, and a low controlled price has, according to the owners, forced them to operate at a loss.

Due to a 30 pct wage increase since July of last year, plus increases in the cost of coal, power, and timber, it is estimated that production costs of ore have gone up 45 pct in the past year.

Commerce Dept. Warns Of Acute Car Shortage During Harvest Period

Washington

• • • **Declaring that** current freight car traffic is running well ahead of 1946 and even the peak war periods, the Commerce Dept. warns that when crops are harvested and ready for shipment later in the summer, the nation will face a more serious car shortage than ever before known.

Little relief appears to be in sight for some time to come, according to Thomas J. Murphy of the Machinery and Metals Section, Office of Domestic Commerce, who points out that even though the output of 10,000 cars a month should be reached, as planned, the actual gain will be only about 7500 since Class I roads are scrapping cars at the rate of 2500 a month.

Trade estimates of requirements, according to a statement by Mr. Murphy, are that 150,000 new cars are now needed exclusive of 574,000 additional ones required to replace cars over 26 years of age.

"Contract freight car builders and railroad shops had 99,346 domestic cars on order as of Apr. 30," Murphy stated. "At theoretical capacity, about 15,000 cars a month, this alone is enough to keep them running for almost 7 months. There are, however, no expectations that such capacity operations will be achieved."

Although there are 24,000 fewer freight cars running today than in early 1946, Commerce reports, more than 18 million cars were loaded during the first 22 weeks of 1947. This is 16 pct above the same period in 1946 and 4 million carloads more than the first 22 weeks of 1940.

Navy Says Pacific Scrap Possibilities Not Very Bright

Washington

• • • **With a provision** in the military establishment appropriation bill permitting the Army to use funds realized from the sale of scrap metal for preparation, handling and transportation of such scrap, it appears likely that one stumbling block to the return of scrap from Europe may be wiped out.

The Navy has always had such authority, but the inaccessibility of much of the scrap under the Navy's jurisdiction in the Pacific has made the cost of handling and transportation so high that money realized from sales would not cover the costs. These and other factors will be discussed in a Navy report on scrap expected to be released early next week. The report will cover the scrap survey trip made by a committee representing both the steel and scrap industries under Navy sponsorship.

The report will show that more than 250,000 tons of ferrous scrap were discovered in the Western Pacific, of which slightly more than 150,000 tons were deemed economically feasible to return to this country. Stumbling blocks to the return of even this limited quantity are scarcity of labor and equipment, high costs, and inaccessibility. Finally, large quantities were found to be of inferior grades.

The industry is currently directing its efforts toward obtaining some of the rubble scrap from the American and British zones of Germany. This scrap is under the control of the joint export-import agency as custodian for the German people. It is reported that British, Canadian, and Belgian buyers have already obtained quantities of this scrap. But thus far American efforts have been unsuccessful. One of the difficulties connected with buying this scrap is the condition that the buyer must arrange for labor to handle, prepare and ship it.

Army-generated scrap sold by the U. S. forces in Europe is not being moved very rapidly. One shipment of 38,000 tons in Austria sold to an American buyer several months ago is still in Europe. Another lot of 147,000 tons has reportedly been sold to an American and is awaiting shipment at Bremen. The buyer has now asked the Army to deliver the scrap to the Brenner Pass for shipment to Turin, Italy, for preparation prior to shipment to the United States. This roundabout method of transportation has led some officials to believe that this scrap will never reach the United States and efforts are being made to assure shipment here since Army-generated scrap is sold to American buyers with the understanding that it will reach this country.

Local NLRB Boards To Review Cases Under New Taft-Hartley Act

Washington

• • • **Squaring away** in anticipation of an increasing administrative burden, the National Labor Relations Board has issued instructions to its 21 field offices to go over the 4300 cases now on their books and throw out those which have been out-dated by the Taft-Hartley Act.

Local boards were ordered to immediately dismiss all complaints and cases in which supervisory employees were seeking certification. Also, all cases were to be cleared which involved units of guard organization.

The boards were told to examine immediately all cases in which complaints have been issued but no hearings had started. In cases where the alleged violations also constituted illegal conduct under the new act, hearings were to go ahead as scheduled; all other cases are to be sent to Washington.

In other instances concerning election cases, local boards were to continue scheduled hearings but in the cases of craft units and professional workers, no recommendations were to be made. Complete records of such hearings are to be forwarded to Washington for recommendation.

In respect to conducting elections, immediate compliance is to be made with Sec. 9 which provides that no election should be directed in any bargaining unit which had held a valid election during the previous 12 months. Employees out on strike and not entitled to reinstatement were ruled ineligible to vote.

Extends Export Powers

Washington

• • • **Congress approved and sent to the President late last week legislation extending certain powers relating to the domestic allocation of specific materials as well as broad export powers until Feb. 29, 1948.**

The legislation continues domestic allocation of tin and tin products, but removes import controls on tin ores and concentrates. Existing controls on antimony are extended without change.

Export controls were also continued. Priorities will be granted for export needs after certification by the Secretaries of State and Commerce that the material should be exported to carry out foreign policy aims or that its export would aid in the production of materials needed by the United States. The Secretary of Commerce is given the authority to halt the export ot materials that would have an adverse effect on the domestic economy.

Also continued were the emergency powers held by Office of Defense Transportation pertaining to the use of facilities and transportation equipment by railroads.

President Calls For Delay On Coal And Steel Price Jumps

Washington

• • • **Claiming that** coal and steel producers "have been enjoying their full share of the high profits" of present prosperity, President Truman on Monday, July 14, called upon the two industries to keep prices at present levels until actual costs under the new coal wage agreement have been worked out in the light of experience.

"The people of the country have the right to demand that their prosperity shall not be imperiled by immediate increases in the price of coal and the price of steel," Mr. Truman said. Should such increases result in a new round of wage and price demands, he added, it would be a serious blow to the economy.

Operators themselves have asserted that certain provisions and conditions of the contracts should increase productivity, the President said, and the amount of increase needed, if any, cannot be determined until the agreements have been in effect.

Walter Tower Sees Steel Capacity Sufficient Past 1950

Tells Steel Subcommittee That Present Unusual Demand Will Slacken Soon

Washington

• • • **Present and** planned steelmaking capacity is and will be sufficient past 1950 to meet any foreseeable demand on the basis of full employment and production, Walter S. Tower, president of the American Iron & Steel Institute, told the steel subcommittee of the Senate Small Business Committee on July 9.

The present excessive demand for all steel products, caused by unprecedented production of durable goods, will not keep up for more than a few months, he added. Already there is slackening of these pressures in a number of fields, including orders for tool steel, stainless steel, some alloys and some bar mill products, Mr. Towers said.

When the war broke out in Europe in 1939, he said, the capacity of steelmaking furnaces amounted to about 82 million tons; at that time, the steel industry was severely criticized in some quarters as being overexpanded. During the war, capacity was further expanded to about 92 million tons.

"The steel industry has always kept its ability to produce equal to, if not ahead of, any sustained demand for its products," Mr. Tower declared.

Present plans, which have been seriously delayed by strikes in the steel and other industries, include construction of nearly 3 million tons in additional rolling capacity, one of the present critical spots in the industry. This will increase the potential production of hot and cold-rolled sheet and strip to an annual rate of 18 million tons—4 million above any previous shipping record.

Approaching the question of sufficiency of capacity from a different angle than any yet presented before the subcommittee, Mr. Tower produced statistics to show that were all steel-consuming industries to operate at maximum prewar capacity, there would still be steel left over in the event steel mills continued present high production.

He emphasized that already this year more than 31 million tons of finished steel had been shipped—almost exactly the annual average tonnage over the span of years between the two world wars.

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As supporting evidence, Mr. Tower offered figures for the maximum estimated consumption of 18 major consumers (see accompanying table) for their peak production year between 1923 and 1941, showing the total as requiring little more than 37 million tons of finished steel. He pointed out that no more than five of the group showed a record performance in any one year.

Inasmuch as these 18 industries account for about 75 pct of finished steel consumption, if all peacetime record demands had occurred simultaneously, an annual supply of slightly less than 50 million tons would have been sufficient. At the present rate of 66 million tons, this would leave 15 million tons for unanticipated requirements.

The AISI president told the group that he did not believe present exports as a whole were having a serious effect on the domestic economy, although foreign shipment of a few specific items would have a definite effect. He estimated probable export totals at about 6 pct. (The Martin subcommittee believes it is about 12-13 pct.)

Moreover, he added, the present high foreign demand would slacken off after a year or two as war-battered nations got their own facilities back into production.

Enlarging upon his statement that pressure was easing on parts of the steel industry at request of the committee chairman, Mr. Tower said that tool steel facilities were operating at about 60 pct, that normal delivery can be had for the most part on stainless steel orders, and that there are few unusual delays in delivery of some types of bar products, although this is not necessarily true in a few specific spots.

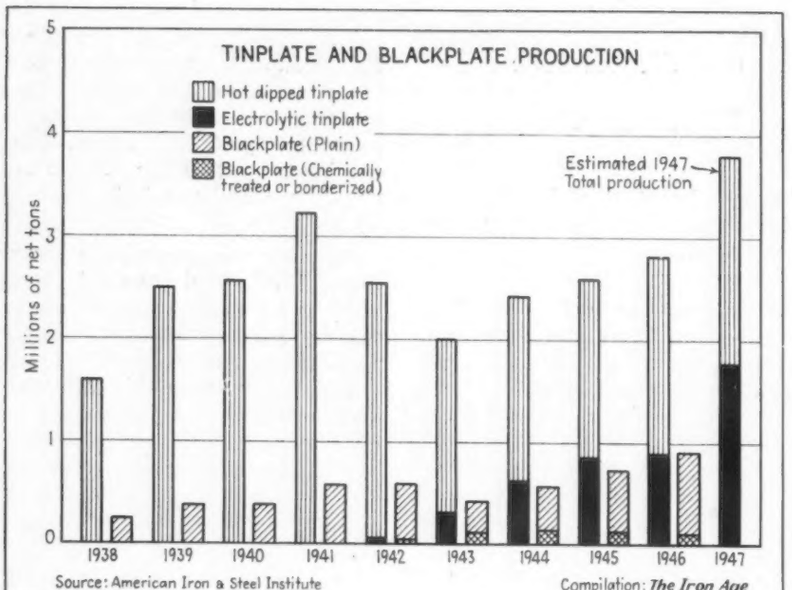
Likewise, he estimated that demand for high alloy steel is down to 75 pct of electric furnace capacity. By the end of 1947, he forecast, barring unforeseen developments, delivery time for most categories of steel products should be down to about normal.

Peacetime Peak Production and Estimated Steel Consumption of Principal Steel-Consuming Industries

	Peak Year	Production, Units	Steel Purchased Per Unit Produced	Estimated Total Steel Consumption Peak Year (Net Tons)
Passenger automobiles	1929	4,587,400	1.7 Net Tons	7,800,000
Trucks	1937	893,085	2.5 Net Tons	2,233,000
Freight cars	1923	178,166	17.5 Net Tons	3,118,000
Passenger cars	1926	2,900	46 Net Tons	133,000
Locomotives	1923	4,400	200 Net Tons	880,000
Rails	1926	—	—	3,804,000
Rail fastenings	1926	—	—	1,470,000
R. R. frogs and switches	1929	—	—	162,000
Mechanical refrigerators	1941	3,900,000	225 lb	439,000
Washing machines	1941	1,892,435 electric 122,000 gasoline	130 lb	131,000
Kitchen ranges	1941	2,300,000 gas 729,000 electric	200 lb	304,000
Farm machinery and equipment	1941	—	—	1,553,000
Ships and ship repairs	1939	—	—	489,000
Steel barrels	1940	16,350,000	40 lb	327,000
Other containers	1941	—	—	3,185,000
Machinery and tools	1939	—	—	1,000,000
Oil, gas and mining	1940	—	—	1,788,000
Total construction	1929*	—	—	8,643,000
TOTAL				37,256,000

* Includes residential construction. In 1925, peak year, 729,000 single and 2-family homes were built, taking an estimated 1,575,000 tons of steel, including heating systems.

Electrolytic Tinplate Output Seen



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By TOM LLOYD
Pittsburgh Regional Editor

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Pittsburgh

• • • **July will see** electrolytic tinplate production surpass in tonnage that produced by the hot dip method for the first time since the inception of the process. This war infant has matured rapidly in the face of tin shortages and limitations by the government of the use of tin for containers, and the last 6 months of 1947 will see electrolytic tinplate assume leadership that it should never lose.

On the basis of shipments through April 1947, electrolytic plate accounted for 455,750 net tons of the 1,087,745 net tons total, or slightly better than 41 pct. Through June, it is estimated that electrolytic tinplate represented 43 to 45 pct of the total tinplate shipments. Currently, leading observers indicate that electrolytic plate production is exceeding the hot dipped tinplate, but only the final production figures for July will verify these estimates.

It is believed by leading tinplate producers that 1947 output should hit the new peak of between 3,700,000 and 3,800,000 net tons. Closing out the year, production of electrolytic tinplate should represent 55 to 60 pct of the total. While it will not be 55 to 60 pct of the total produced for the year, production in the closing months of 1947 should be at that rate. Based on January through April output, 1947 production should hit 3,263,000 tons, 1,600,000 tons of which will be electrolytic.

From a meager 3.2 pct of tinplate output in 1942, this process has gained steadily in importance, as indicated tonnage-wise in fig. 1 and percentagewise in fig. 2. The capacity of the steel industry for producing electrolytic tinplate as of Dec. 31, 1946, according to informed sources, was 2,231,000 net tons, just about the same as shown in the Iron & Steel Works Directory, 1945 edition, of the American Iron and Steel Institute. However, changes not taken into consideration in the physical tinplate producing equipment and also in allied processes that furnish raw material for the electrolytic lines affect this capacity.

At the close of the war, there were 28 electrolytic tinning lines for wide tinplate in operation, plus about a dozen more for narrow strip, the product from which was used mainly in specialty items. The 28 lines, however, were the ones that formed the great white hope of the food consuming world. Data concerning these lines are shown in table I, with the changes that have and are being made.

Crucible Steel Co. of America, a pioneer in electrolytic tinning, has dismantled its line at the Midland, Pa., Works, and is no longer participating in this field. Carnegie-Illinois originally had three lines at Irvin Works, Pittsburgh, and four lines at Gary, Ind., but one of the latter is no longer operative, bringing the total for the company down to six lines. Tennessee Coal, Iron & Railroad Co. had three lines at its Fairfield, Ala., plant, but one has been dismantled and is being shipped to Columbia Steel Co.'s Pittsburg, Calif., plant, where it will be reassembled and put into operation. Both Republic Steel Corp's Niles plant at Warren, Ohio, and Weirton Steel Co.'s Weirton plant have electrolytic capacity, but one line at each plant has been diverted to electrolytic galvanizing. This leaves Republic with one line on tinplate and Weirton with two lines on tinplate.

Thus, the total capacity of the electrolytic tinplate industry has been somewhat reduced from the war peak. It is probably somewhat closer to 2 million tons now than the 2,231,000 tons indicated at the end of 1946. There are only 23 electrolytic lines operating at present, with one more to come into operation probably in 1948 at Columbia.

Since the end of the war, steel producers have been improving facilities closely allied to the production of tinplate. This has been largely in the form of adding cold reduction capacity along with complementary equipment for annealing, pickling and processing. Bethlehem is currently building cold reducing, pickling and annealing capacity at Spar-

Passing Hot Dipped This Year

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General Line Can Demand Is Big Factor in Raising Electrolytic Output

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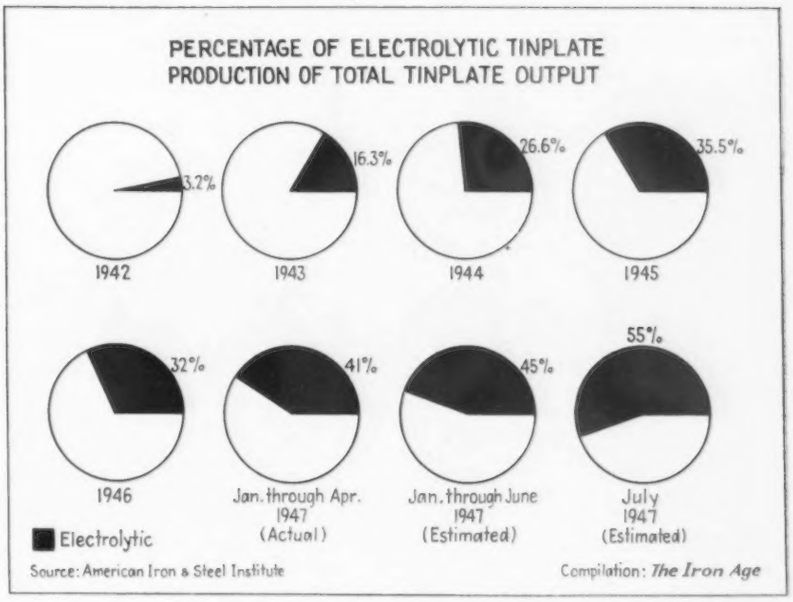

rows Point. Weirton recently completed construction of the world's fastest cold reduction mill, the bulk of the output from which will go into tinplate. It will be later in the year before this mill operates at capacity, since available power is still limited. Jones & Laughlin is building a similar cold reduction mill at Aliquippa and additional annealing and pickling capacity. U. S. Steel has been improving its flat rolled capacity constantly since the end of the war and is putting in a complete cold reduction mill at Columbia Steel on the Coast. This expansion of capacity will be used largely to supply material for the tin line going in at that plant.

Carnegie-Illinois is adding cold reduction and allied capacity at Gary and Irvin Works. Tennessee Coal, Iron & Railroad Co. is adding hot dip tinplate capacity. Republic Steel is adding annealing capacity for tin mill strip at Niles and Cleveland. Likewise, other producers have been getting their flat rolled productive capacity into better balance, and many of these improvements are being made with an eye to the tinplate market.

Despite the reduction in capacity, there is still plenty of room for greater production of electrolytic tinplate. In 1946, electrolytic production was less than 1 million tons, so that production could practically be doubled without pushing the capacity of the industry. It is not too far fetched, however, to predict that this capacity will just about be reached within a year. If electrolytic accounted for a full 55 pct of the anticipated 3,800,000 tons to be produced in 1947, the production of light coated plate would approximate 2 million net tons. Thus, if tinplate demand continues to increase, as some observers believe, there is a chance that capacity diverted to galvanizing will be put back on tinplate, means of speeding up existing capacity will be sought, and perhaps even new capacity will be added.

No one anticipates that electrolytic tinplate will completely replace hot dipped plate. For certain uses, such as packaging acidic fruits and berries, hot dipped plate is still the only answer. On the other hand, producers of the bulk of general line and sanitary cans, cans for petroleum products, and milk and beer cans are going to electrolytic tinplate. General line and sanitary cans now are mainly the lightest coated cans, 0.25 lb of tin per base box, as are all product cans. Beer is packed in 0.50 lb cans, and milk utilizes the heaviest electrolytically tinned can, running 0.75 lb per base box. The packing of milk in electrolytically coated cans has gained in importance recently because of the higher costs of tin. It is estimated by one observer that the milk packers save nearly $4 million annually on the basis of current packs at the present 80¢ a lb price of tin.

While always a potential threat, the availability of tin has not been a limiting factor in the production of tinplate. Instead, cold reduced sheet and strip have been more of a problem. Possibly as producers expand their cold reduction capacity and boost up their production of tinplate during 1948, tin will limit tinplate output, but this is pure speculation. One prominent purchasing agent for a large steel company recently indicated that he believed tin would be scarce by the end of 1947, but supplies should be wholly adequate by 1950. Other observers feel that tin supplies will be fully adequate in another year and a half to two years, since it will take no longer than that to get into production tin mines and smelters wrecked by the Japanese during the war.

Tinplate is one of the best paying products on the steel industry's product roster. Further, it is unique in that over the long period it shows a consistent gain but never reflects the high peaks or low valleys in demand that other items do. It is the closest the steel industry comes to the consumer market, and, since food is grown and must be packed every year, the market is relatively stable. Food cans make up about 80 pct of the container industry's consumption of tinplate, and the container industry consumes some 75 to 80 pct of the tinplate produced. While tinplate nor-

ELECTROLYTIC TINPLATE LINES

Company	Original No. Of Lines	No. Lines Now In Operation	Original Capacity, Net Tons	Remarks
Bethlehem Steel Co.				
Sparrows Point, Md.	3	3	216,000	
Carnegie-Illinois Steel Corp.				
Gary, Ind.	4	3	507,600	
Irvin Works, Dravosburg, Pa.	3	3		
Crown Cork & Seal Co.				
Baltimore	1	1	50,000	
Crucible Steel Co. of America,				
Midland, Pa.	1	0	not known	Dismantled, 1944
Granite City Steel Co.				
Granite City, Ill.	1	1	50,000	
Inland Steel Co.				
Indiana Harbor, Ind.	2	2	124,000	
Jones & Laughlin Steel Corp.				
Aliquippa, Pa.	2	2	150,000	
Republic Steel Corp.				
Warren, Ohio	2	1	83,000	1 line used for electrogalvanizing
Tennessee Coal, Iron & Railroad Co.				
Fairfield, Ala.	3	2	225,000	1 line being shipped to Columbia Steel
Weirton Steel Co.				
Weirton, W. Va.	3	2	636,250	1 line used for electrogalvanizing
Wheeling Steel Co.				
Yorkville, Ohio.	1	1	90,000	
Youngstown Sheet & Tube Co.				
Indiana Harbor, Ind.	2	2	150,000	
Columbia Steel Co.				
Pittsburgh, Calif.	..	1		Being shipped from TCI&RR Co. will be in operation in 1948
Total	28	23	2,281,850	

mally makes up about 7 pct of the total finished steel produced, in recent years this has not been true because of the emphasis on production of war goods. It is expected that by 1948 tinplate will resume its normal position, since by that time restrictions on the use of tinned containers for certain types of packs will be removed.

As tinplate production resumed after the end of the war, there were two major changes in the container industry. First, there was a perceptible easing in the demand for glass containers in 1947. Second, there was a definite decline in the production of bonderized plate for containers. Producers indicate that bonderized black plate (listed as chemically treated black plate in steel production statistics) is hard to make and not too profitable. Furthermore, canmakers had considerable difficulty in sealing the cans since the bonderized can does not solder. Some companies have already abandoned their bonderizing lines.

The tinplate industry is definitely regaining its markets that were lost during the war when tin restrictions forced food packers to use glass containers. As tin controls ease, electrolytic demand should become greater, since packers of many items that are now, by government ruling, packed in black plate will switch to electrolytic plate if for no other reason than the fact that the tinned plate can be soldered easily.

There are still some problems with electrolytic tinplate in so far as corrosion resistance is concerned. Variations or inconsistency of corrosion resistance is the main difficulty, since the reaction of electrolytic tinplate to corrosive actions is somewhat unpredictable. When this problem is solved, consumption of electrolytic tinplate will hit its peak and hold its position. With a normal 3 to 5 yr shelf life for canned materials, packers want to be more certain of the ability of the electrolytic tinplate to withstand corrosive actions.

Coming Events

Aug. 25-29 National Assn. of Power Engineers, Inc., Boston.

Sept. 8-12 Instrument Society of America, conference, Chicago.

Sept. 17-26 National Machine Tool Builders' Assn., machine tool show, Dodge-Chicago Plant, Chicago.

Sept. 22-25 Assn. of Iron & Steel Engineers, annual meeting, Pittsburgh.

Sept. 29-Oct. 3 American Gas Assn., San Francisco.

Oct. 2-3 Gray Iron Founders' Society, annual convention, Milwaukee.

Oct. 6-7 Packaging Machinery Manufacturers Institute, annual meeting, Springfield.

Oct. 9-10 Porcelain Enamel Institute, annual meeting, Cleveland.

Oct. 16-17 National Conference on Industrial Hydraulics (formerly Hydraulics Machinery Conference), annual meeting, Chicago.

Oct. 18-24 National Metal Exposition, Chicago.

Oct. 30-Nov. 1 American Society of Tool Engineers, semi-annual meeting, Boston.

Oct. 31 Illinois Mining Institute, annual meeting, Springfield, Ill.

Nov. 7-8 Annual Conference on X-Ray and Electron Diffraction, Mellon Institute of Industrial Research, Pittsburgh.

Authorizes Building Of Six Compressor Stations

Washington

• • • **In an attempt** to alleviate anticipated shortages of natural gas in the Appalachian areas this coming winter, WAA has authorized the erection of six new compressor stations along the route of the "Big Inch" and "Little Big Inch" pipelines which will increase the daily capacity of the lines by about 200 million cu ft. Present capacity is approximately 140 million cu ft per day and the work necessary to up the total to 340 million cu ft is expected to be completed by February 1948.

The six new compressor stations consisting of approximately 45,000 hp will be constructed by the Texas Eastern Transmission Corp., lessee of the pipelines. These new stations will augment an additional four stations of 28,000 hp previously authorized and now under construction.

In order to make possible the construction of these stations without delay and to assure that there will be no interruptions of service from the lines during the coming winter, WAA has extended the Texas concern's lease to May 31, 1948.

Weekly Gallup Polls . . .

Analyzes Performance of Congress on Election Mandates

Princeton, N. J.

• • • **Has the Eightieth** Congress carried out the mandate it got from the people at last November's election?

In two respects, according to George Gallup, director, American Institute of Public Opinion, it has —by passing labor union control regulation and by continuing support of President Truman's foreign policy.

In two other respects it has failed, at least so far, to carry out the mandate of 1946. No action has been taken yet on military training and on minimum wages, although bills on both subjects have been prepared and introduced.

From election returns it is not possible to tell what mandate the voters are actually giving the men they elect. No one knows whether people are voting on specific issues, or simply passing judgment on the abilities and personalities of candidates, or merely voting a straight party ticket without reference to issues at all.

But it is possible to define mandates through the modern instrument of the public opinion sampling poll. By these polls it can be determined, at the time an election is held, what people are thinking about specific issues, as distinguished from candidates. That was done by the institute in a nationwide sampling referendum last November, just before the country in the election gave Republicans control of both the House and the Senate.

With some of the major mandates defined in this way, it is possible now, 7 months later, to give an accounting of the performance of the Eightieth Congress on certain major issues, as follows:

Labor—On Nov. 10, 1946, 4 days after election, the institute reported: "The country has given the new Congress an unmistakable mandate to control and regulate strikes and labor unions."

The evidence was cited in the results of a pre-election sampling referendum on the question: "Should the Congress elected in November pass new laws to control labor unions?" The vote was 66 pct in favor, 22 pct opposed and 12 pct undecided. Other polls also found the public supporting curbs on "featherbedding" and jurisdictional strikes and approving cooling-off periods before strikes, and other specific items which are found in the Taft-Hartley act.

Military Training — "Universal military training in peacetime has the 'go ahead' signal from the American people," reported the institute in the same Nov. 10 story.

It had just polled the people on the question: "Should the Congress elected in November pass a law to require every physically fit young man who has not served in the armed forces to take military or naval training for 1 year?" The vote was more than 2-to-1 in favor—67 pct "yes," 25 pct "no," and 8 pct "no opinion."

Today, 7 months later, the vote has risen to 74 pct in favor, judging by the institute's test survey. Whether Congress will take action on military training at this session is still problematical.

Minimum Wages—While favoring restrictions on organized labor, the voters when they went to the polls last November were not opposed to raising minimum wage requirements.

The institute reported at the time: "In spite of the unmistakable swing to the right politically which the election showed, the country has not swung away completely from social and economic reform.

"For example, the same voters who went to the polls Tuesday and caused control of the House to shift to the GOP have in a sampling referendum signified their approval of legislation to raise the minimum wage level of the country from the present 40¢ an hr to 65¢. This measure has majority backing from Democratic, Republican and Independent voters alike . . ."

Popularity of England's Prime Minister Attlee Seems to Be Stabilized

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In June a bill was introduced in Congress to raise the minimum wage of workers in industrial firms engaged in interstate commerce from the present 40¢ an hr to 75¢ within the next 2 years.

Action on the bill at this session is considered doubtful.

Foreign Affairs—Congress has in general supported President Truman's foreign policy, which has majority approval among the voters.

Reporting that the marked Republican victory in the election "should in no way be interpreted as signifying a desire by the people to return to isolationism," the institute pointed out that the people were not divided over foreign policy, and that they continued to support overwhelmingly the program of firmness toward Russia.

Taxes—On the subject of tax reduction the voters were in something of a dilemma when they voted in the 1946 election.

Desire for tax cuts conflicted in their minds with fear of the large public debt. On the basis of surveys at the time, the institute concluded that no clear mandate had been given by the voters one way or the other on the matter of income tax reduction.

Since that time surveys have found that when voters are asked to choose between tax reduction and debt reduction, the weight of sentiment is on the side of cut-

(CONTINUED ON PAGE 143)

Industrial Briefs . . .

• STARTS CONSTRUCTION — The Turner Construction Co. of New York, general contractors, have started work on a maintenance building for the Carborundum Co., Niagara Falls, N. Y., the first major structure in an expansion program which eventually will involve expenditure of $50 million. The steel, concrete and brick building, including equipment, will cost about $1,250,000.

• SELLS COMPANY — Champion Machine & Forging Co. was sold to Walter E. and Harold C. Schott, Cincinnati industrialists. The transaction involves more than $2 million and included the real estate, machinery inventory tools, dies and jigs.

• OFFERS BUILDINGS—WAA is offering for sale on a competitive bid basis buildings and equipment which cost the government nearly $2 million, at the Sangamon Ordnance plant near Illiopolis, Ill. Included in the offer are five boiler houses, an administration building, cafeteria building, two large dormitories, two shops, a laundry building and miscellaneous structures. Sealed bids will be accepted on any or all of the buildings until July 17.

• STEEL WAREHOUSE — Weiss Steel Co., Inc., Chicago, has taken over the Midland Steel & Equipment Co. in the steel warehousing business.

• MORE IMPLEMENTS—Deere & Co., Moline, Ill., has purchased the Des Moines Ordnance plant at Ankeny, Iowa, for $4 million. It is planned that the new plant will eventually employ 1500 to 2000 people and will be in full production on farm implements within a year.

• NEW DIVISION—Amalgamated Steel Corp., Cleveland, has announced the formation of a Tool Steel Div. to be known as Malga Steel Service. The new division is headed by E. R. Dallas of Cleveland and H. E. Zecman of Detroit.

• ADIRONDACKS ORE — Joseph R. Linney, who was in charge of Republic's Adirondacks mining operations, has written a novel published by Dorrance & Co., "The Touch of Human Hands." It is a story of life in the mining towns of the New York district.

• CONTAINERS—Several million miscellaneous containers are listed in WAA catalog CG-26-1260 for sale at fixed prices concurrently to priority and nonpriority buyers. These containers are being offered by sealed bid. Bids close July 24.

• COMPLETES PLANT—Completion of a $250,000 boiler plant and provisions for spending $60,000 for burner and oil storage tank facilities as standby equipment in case of a gas curtailment in the winter months has been announced by Empire Steel Corp.

• ANNIVERSARY — Pablo Maspero & Sons, Buenos Aires, Argentina, metalworking concern, has announced the celebration of their 60th anniversary.

• STAINLESS WIRE — American Steel & Wire Co., subsidiary of U. S. Steel Corp., is making a substantial addition to its plant in Waukegan, Ill. The new mill unit will be used for the production of stainless steel wire. The corporation subsidiary is the largest basic wire drawing plant in the country, having a capacity of 75,000 miles of wire per day.

• NEW MODEL—Seeger Refrigerator Co. are now making the new Coldspot refrigerator for Sears, Roebuck & Co. The new model features a rear mounted motor unit which permits a 30 pct increase in the storage space without any increase in overall dimensions. Current models are being manufactured at Seeger's St. Paul, and Evansville, Ind., plants. The industrial design firm of Sundberg-Ferar of Detroit, collaborated with Sears in the design and styling of the new models.

WAA to Publish Three Catalogs Listing Surplus Equipment on Tools

Chicago

• • • **Three catalogs** offering heat treating equipment and machine tools which cost the government nearly $10 million will soon be published by WAA, and interested industrial concerns are urged to write the WAA Customer Service Center in Chicago or Milwaukee, to place their names on the mailing list.

Catalog CG-68-1215 lists industrial heat treating equipment, including drying ovens, both gas fired and electric, draw furnaces, gas fired and electric of the box, pit, and rotary type, and furnaces for nitriding, carburizing, annealing and forging, some of the latter oil fired. The mailing date of this catalog is July 11, the sale beginning July 28, with all items at fixed prices.

Listed in catalog CG-85-1243 are machines for boring, drilling, gear cutting and finishing, grinding, and milling, as well as lathes and miscellaneous machines. This catalog will be mailed about July 16 and the sale at fixed prices opens to priority and nonpriority buyers on July 30. The donation period to tax supported and tax exempt organizations begins Aug. 13.

Among machines listed in catalog CG-85-1244, are those for boring, milling, gear cutting and finishing, drilling and grinding as well as lathes and miscellaneous machines. This catalog will be mailed about July 14. The sale at fixed prices will begin July 28, and the donation period to tax supported and tax exempt organizations begins Aug. 11.

B&O Purchases Ten Mallet Locomotives

Baltimore

• • • **Ten high-speed** Mallet locomotives that have been riding the rails of the Seaboard Airline Railway have been purchased by the Baltimore & Ohio Railroad, it was announced recently by Roy B. White, president of the B&O.

The freight power of the B&O will be further augmented in the first quarter of next year, when delivery of 20 new 3000 hp diesel-electric freight locomotives is scheduled.

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

3500 Tons, Los Angeles, Prudential Insurance Co. of America office building, through William Simpson to Bethlehem Pacific Coast Steel Corp., San Francisco.

3000 Tons, Alexandria, Va., power plant for Braddock Light & Power Co. to Bethlehem Steel Co. through Stone & Webster Engineering Corp., Boston, engineers.

360 Tons, Oakland, Calif., overcrossing over East Shore Freeway at 29th Ave., through Lew Jones Construction Co. to Bethlehem Pacific Coast Steel Corp., San Francisco.

360 Tons, Philadelphia, Aetna Steel Products Co., to Bethlehem Steel Co., Bethlehem.

300 Tons, Philadelphia, Philadelphia Inquirer, building, through McCloskey & Co., to American Bridge Co., Pittsburgh.

300 Tons, Philadelphia, warehouse for Pennsylvania Sugar Co., to Bethlehem Steel Co., Bethlehem.

260 Tons, Yavapai County, Ariz., Santa Maria River Bridge, Wickenburg-Kingman Highway, to Allison Steel Co., Phoenix.

250 Tons, Los Angeles, extension of scrap yard, Bethlehem Pacific Coast Steel Corp., to Bethlehem Pacific Coast Steel Corp., San Francisco.

190 Tons, Plymouth Meeting, Pa., E. J. Lavino Co., to Lehigh Structural Steel Co., Allentown, Pa.

170 Tons, Philadelphia, Hardwick & McGee Co., to Lehigh Structural Steel Co., Allentown, Pa.

160 Tons, Washougal, Wash., bridge over Washougal River, to Gunderson Bros., Portland.

150 Tons, Chesterfield, Mass., state bridge to Bethlehem Steel Co., Bethlehem. Reported last week as 1500 tons in error.

130 Tons, Los Angeles, extension telephone building, Axminster exchange, to Consolidated Steel Corp., Los Angeles.

• • • **Fabricated steel inquiries** this week included the following:

8175 Tons, Chicago, Midland power station for Commonwealth Edison Co.

6500 Tons, East St. Louis, bridge across Mississippi River. Bids close July 21.

3150 Tons, Newark, N. J., viaduct over Pennsylvania and Lehigh Valley railroads, New Jersey Dept. of Highways, Aug. 7.

1900 Tons, Bellview, Neb., power station for Central Nebraska Power Co.

1800 Tons, Baton Rouge, La., extension to Gulf States Utilities Co. Louisiana station. Stone & Webster Engineering Co., Boston, engineers.

1500 Tons, Indianapolis, war memorial building for American Legion, abandoned.

1050 Tons, Indianapolis, building for News Publishers Co., abandoned.

860 Tons, Nashville, Tenn., viaduct Tennessee State Highway Dept.

700 Tons, Allegheny County, Pa., bridge, Pennsylvania Dept. of Highways, Aug. 8.

665 Tons, Luzerne County, Pa., bridge, Pennsylvania Dept. of Highways, July 25.

600 Tons, Newark, N. J., Route 25 at Magazine St. and Charles St., New Jersey Dept. of Highways, Aug. 1.

600 Tons, Los Angeles, transmission towers for Los Angeles Bureau of Power and Light.

280 Tons, Los Angeles, oil derricks, Steel Ore Derrick Co.

250 Tons, San Diego, Lattice transmission poles, San Diego Gas & Electric Co.

250 Tons, Middlesex County, N. J., Route 4 Parkway, bridge, New Jersey Dept. of Highways, July 29.

228 Tons, Newark, N. J., Port St., Delancy St. and LVRR, bridge, New Jersey Dept. of Highways, Aug. 5.

200 Tons, Essex County, N. J., Route 25, bridge, New Jersey Dept. of Highways, July 29.

200 Tons, Newark, N. J., Roanoak Ave. and Foundry St., bridge, New Jersey Dept. of Highways, Aug. 1.

150 Tons, Los Angeles, office building, Westinghouse Electric Co.

110 Tons, Stafford, Ariz., San Simon River bridge.

• • • **Reinforcing bar awards** this week included the following:

850 Tons, Fort Peck, Mont., John Moses Veterans' Memorial Hospital, through McGough Bros. to Joseph T. Ryerson & Son Inc., Chicago.

300 Tons, Chicago, University of Chicago, accelerator building through J. W. Snyder Co. to Ceco Steel Products Corp., Chicago.

245 Tons, Dinuba, Calif., Kings River bridge, through Carl N. Swenson Co. to Gunn Carle & Co., San Francisco.

120 Tons, Sauk City, Wis., milk plant through J. T. Cullen & Sons, Janesville, Wis., to Ceco Steel Products Corp., Chicago.

100 Tons, Ashland, Wis., power house through La Crosse Dredging Corp. to Bethlehem Steel Co., Bethlehem.

100 Tons, Oakland, Calif., overcrossing over East Short Freeway at 29th Ave., through Lew Jones Construction Co. to Soule Steel Co., San Francisco.

• • • **Reinforcing bar inquiries** this week included the following:

2000 Tons, Chicago, Kostner Ave. sewer project, City of Chicago, previously reported. Tully Construction Co. is low bidder.

275 Tons, Urbana, Ill., chemistry and chemical building, University of Illinois, bids close July 15.

Turner Construction To Assist in Building Lock on Mississippi

New York

• • • **Turner Construction Co.** is one of six heavy contractors comprising the River Construction Co. which successfully bid for the building of Locks No. 27 on the Mississippi River for $16,626,000, according to an announcement made recently by the Turner company. Locks No. 27 will be the main feature of an 8-mile canal which will be constructed to bypass a treacherous stretch of water at St. Louis, just below the point where the Missouri joins the Mississippi. It will take more than three years to complete.

The five other contractors in the River Construction Co. are: Spencer, White & Prentis, New York; Raymond Concrete Pile Co., New York; Winston Brothers, Minneapolis; Al Johnson Construction Co., Minneapolis; and Morrison-Knudsen, Inc., Boise. Construction of Locks No. 27 was put out for bids by the U. S. Corps of Engineers. Under the contract awarded the River Construction Co., concrete aggregates will be furnished by the government.

A projected scheme for damming the Missouri and improving its navigation is now starting, so that eventually the Granite City Locks (Locks No. 27) will have to accommodate both Mississippi and Missouri River traffic. For this reason, Locks No. 27 is larger than any of the 26 above it.

The main lock at Granite City will be larger in respect to length of chamber and height of walls than the Gatun Locks and Miraflores Locks of the Panama Canal.

The chamber will be 110 x 1200 ft, 92 ft high with walls 42 to 8 ft thick. It is estimated that there will be 2,850,000 cu yd of excavation involved, 392,000 cu yd of concrete, 1500 tons of reinforcing steel and 1050 tons of miscellaneous iron and steel. The 110 ft clear opening lock gates will consist of two sets of the lift type, 63.6 ft high, and two pairs of the miter type, one 69.5 ft high, the other 42.8 ft high.

Lukens Quarterly Profit

Coatesville, Pa.

• • • **Consolidated net** profit of Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc., for the first three quarters of their 1947 fiscal year, ended June 14, is $1,283,696, Robert W. Wolcott, president, reported recently. This is equivalent to $4.03 a share on 317,976 capital shares. This profit is in contrast to a consolidated net loss for the corresponding first three quarters of the 1946 fiscal year of $830,188.66, after estimated recovery of federal income taxes of $625,000.

Sales for the first three quarters of the 1947 fiscal year total $31,196,287, net of discounts and allowances, an increase of 70 pct over the $18,361,729 net, for the first three quarters of the 1946 fiscal year. An important recent Lukens development is the manufacture of a line of stainless-clad steels.

MACHINE TOOLS

. . . News and Market Activities

Sees Lull in Machine Tool Business Following Plant Vacations

• • • **With the exception** of Detroit, the machine tool business has been pretty quiet following the Fourth of July vacations taken by many plants, lasting up to 10 days, and according to some observers, the oft-predicted lull is here at last.

Some representatives are not getting out very many quotations, and in some areas it is evident that other facets of the capital goods industry are showing more life than machine tools at the moment.

Special purpose equipment continues to move rather well in most sectors, particularly Detroit, and there is some demand for lathes, gear cutting machinery, particularly hobbers, and some demand for shapers. Considerable demand for War Assets Administration offerings is evident in most markets despite claims to the contrary.

Dealers are rapidly becoming an important consuming factor in WAA sales and a number of major dealers, particularly a few from the New York area, are buying for stock, and the feeling seems to be that some of the WAA equipment is like wheat in the bin.

While some sources allege that machine tool prices are getting pretty high, the buying that is being done is largely for a specific requirement, or part of a long-range program. Some quotations being made are rather well tied up with the automobile builders' reported changes. In any event, buying in most sectors is not being delayed because of the Machine Tool Show, which has not affected the special purpose equipment or the long-range programs to any discernible extent.

According to reports, the Joint Army, Navy Machine and Tool program is moving very slowly, and tools so tagged for the strategic reserve are still being sold to commercial users. This situation, which is in complete accordance with the instructions of John R. Steelman, has inspired a series of minor uproars by the population aggregate, victims of some newspapers who played the deal

Demand for WAA Offerings Evident in Most Markets Despite Other Claims

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to them in an unfair and unpatriotic light.

In Cincinnati, some 300 registered buyers awaited opening of the WAA sale of heavy machinery. Among them were representatives of Crane Co., Ford Motor Co., Electric AutoLite, International Harvester, and several Cincinnati firms, including Cincinnati Milling Machine Co. and Lodge & Shipley.

Miss Muriel Arbus, head of Arbus Machine Tool Sales, New York, and Maj. K. Y. Loh, Chinese Purchasing Agency, Washington, D. C., were also present and accounted for. Major Loh, incidentally, ordered $10,000 worth of precision machine tools which will cost something like $120 million in Chinese money. After confirmation of this sale, material will be sent to the Chinese liaison office at Williamsport, Pa., for reconditioning and then will be shipped to China.

Major Loh indicated that he had hoped to buy more, but "unfortunately did not draw No. 1 position for the purchases." The first 58 orders accounted for 468 pieces of the 3300 machines being offered, according to Jerry E. Ritter, regional director of WAA.

It was also announced by WAA that the Cincinnati office had accounted for $53,329,000 of the $2,385,000,000 increase in national surplus property sales in the first 11 months of the fiscal year.

Swan E. Bergstrom, chairman of the Machine Tool Show committee, announced that attendance at the show may exceed the 100,000 originally estimated. Mr. Bergstrom said there is a very heavy flow of advance registrations being received daily from United States and abroad. Some 22 foreign countries have sent in registrations. Cincinnati will be well represented at the Machine Tool Show, with about 20 companies planning displays.

In Detroit, a survey of machine tool dealers and producers indicates that business volume has increased noticeably during the past few weeks. The volume of inquiries has increased even more. Some sources have ventured to predict that new transmission and engine developments plus additional interest stirred up at the Machine Tool Show may result in a whopping machine tool volume during the second half of the year.

Numerous foreign inquiries and orders are still being received here by some segments of the industry and indications are that a considerable volume of foreign business may also result from the machine tool showings at Chicago.

The trend toward standardization of body types by auto manufacturers has been evident for some time and some sources believe that General Motors may further reduce its body types as low as three with Chevrolet deluxe bodies being interchangeable with the high-price GM cars. This may be the true interpretation of GM's unprecedented move in scrapping some of its 1948 model dies.

In the East, some machine tool builders are enthusiastic over export prospects in India. Some months ago, Sankalchand G. Shah, vice-president, the All-India Manufacturers' Organization, visited the United States to talk to machine tool builders and steel company executives. Results of Mr. Shah's visit have never come to light, although it is known that he talked to tycoons of the British iron and steel and machine tool industry on his way back to India.

A textile machinery company, H. & B. Co., Pawtucket, R. I., has entered into agreement with the Machinery Manufacturers' Corp. Ltd., Bombay, India, whereby the Indian firm will be provided with designs, specifications and technical assistance to manufacture textile machinery. The Indian company will set up a large plant near Calcutta.

2 ways in which the TAFT-PEIRCE 6" ROTARY SURFACE GRINDER gives you greater Output and Quality in Shorter Time, at Lower Cost

1. TILT THE WHEELHEAD

This exclusive Taft-Peirce feature makes it possible to handle, with ease and speed, angle and shoulder work which otherwise would be difficult or impossible. And with all other types of work — on gages, tools, and small parts — this uniquely designed machine will produce surfaces to a higher degree of accuracy, flatness, and finish than you ever have known before.

2. TILT THE CHUCK

Just make one simple adjustment of the trunnion mounting. Then the 6" Taft-Peirce *Superpower* Rotary Magnetic Chuck, specially designed for this grinder, swivels forward or to the rear through a 7½° angle. This exclusive feature facilitates the accurate grinding of saws, cutters, gear-shaper cutters, and similar tools. The extra-powerful chuck will hold the smallest work-pieces securely in the center of the faceplate.

For full details on these and other features of this machine, write for a copy of the new illustrated bulletin. *The Taft-Peirce Mfg. Co.*, Woonsocket, R. I.

T-P means TOP PRECISION

Visit Taft-Peirce at the Machine Tool Show — Booth 601

Machine Tool Show Notes . . .

Machines Exhibited at Machine Tool Show to Emphasize Speed

• • • **Highlights of** the 1947 Machine Tool Show, which is expected to usher in a new period in American industrial efficiency at the Dodge-Chicago plant Sept. 17 to 26, will be speed and special machines.

For many months engineering staffs at machine tool plants have been racing to complete some of the new models and redesign others which will be shown at this first machine tool show in 12 years.

Sifting the pre-show rumors which are already clogging the atmosphere around machine tool centers brings out the basic fact that the new machines, whether special or standard general purpose, will do the job faster. In addition to speed and greater automaticity, emphasis has been placed on flexibility.

Tool room equipment has been the center of much attention, particularly on the part of the lathe makers, and competition in this line will be keen.

Much of the equipment to be shown will feature automatic lubrication, a greater variety of speeds, push button or finger tip control wherever feasible, new tool relieving attachments. Along with new feeds and speeds, new models have been designed especially for the small job shop, and for the small parts field.

Date for the moving of some $16 million worth of machine tool exhibits into the Dodge-Chicago plant has been advanced by NMTBA from Aug. 25 to Aug. 4, to provide an extra 8 weeks for setting up and placing in operation the same 2000 machines which will be shown.

A number of the machines to be displayed are completely new in principle as well as design, including a grinder on which the grinding operation and the accuracy achieved are entirely independent of the wear of the grinding wheel; cold heading equipment, and other machines so secret at this time that it is known only that they will perform operations in a fraction of the time required under the best previous method.

Many of the machines to be displayed will embody features suggested by users' surveys, which a number of machine tool builders have been conducting for many months. One machine was designed entirely on the basis of such a survey.

Predicts Attendance at Show Will Exceed 100,000 Both From Here and Abroad

o o o

Indicative of the tremendous amount of time, energy and money that is being put into the 1947 Machine Tool Show, one exhibitor will have 29 machines, all new in size, capacity or application; another will have 28 models and types, some entirely new in principle, and a third will show 27 machines, many of them new. The seven machines to be shown by one exhibitor will have a gross weight of 400,000 lb and a value of $325,000.

Among the special machines to be shown are station machines for the automobile industry, sheet grinding and polishing equipment for the steel industry, rails drillers for the railroads, special lathes and boring machines for the electrical parts manufacturers.

Present indications are that electronic equipment will be featured by a number of machine tool builders, as finger tip or push button control at the 1947 show. Trends of the 1935 show, which proved to be a stimulant to all industry, included accessibility of tooling, greater power, shafts were larger, ground gears, antifriction bearings, large chip space, etc.

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Registrations Received from 22 Foreign Countries

Cincinnati

• • • **Attendance at the** Machine Tool Show to be held in the Dodge-Chicago plant, Chicago, Sept. 17 through 26, may exceed the original estimate of 100,000, it was predicted today by Swan E. Bergstrom, chairman of the show committee of the National Machine Tool Builders' Assn., and sales manager, Cincinnati Milling Machine Co.

S. E. Bergstrom

Mr. Bergstrom said a tremendous attendance, both from the United States and abroad, is indicated by the heavy flow of advance registrations being received daily at the association offices in Cleveland.

There will be a number of special flights for visitors bound for the Dodge-Chicago plant from London and other points to New York. Railroad and airline officials in this country are making travel arrangements for the overseas visitors, and for many thousands of visitors from industrial centers everywhere in the United States.

Already registrations have been received from 22 foreign countries, Mr. Bergstrom reported. There will be, in addition, representatives from the resident offices in this country, of Czechoslovakia, France, India, The Netherlands, Poland and USSR. An official party of 30 from the British Machine Tool Trades Assn. will sail from England on the Queen Elizabeth.

Countries from which registrations have been received are Argentina, Austria, Australia, Belgium, British West Indies, Chile, Colombia, Cuba, Denmark, England, Finland, France, Hawaii, Italy, Mexico, The Netherlands, Norway, Palestine, Portugal, Spain, Sweden and Switzerland.

A dinner in honor of the overseas visitors will be held on Tuesday evening, Sept. 23, with Charles J. Stilwell, president, Warner & Swasey Co., as toastmaster.

The Answers are Here . . .

in the Motch & Merryweather

No. 00

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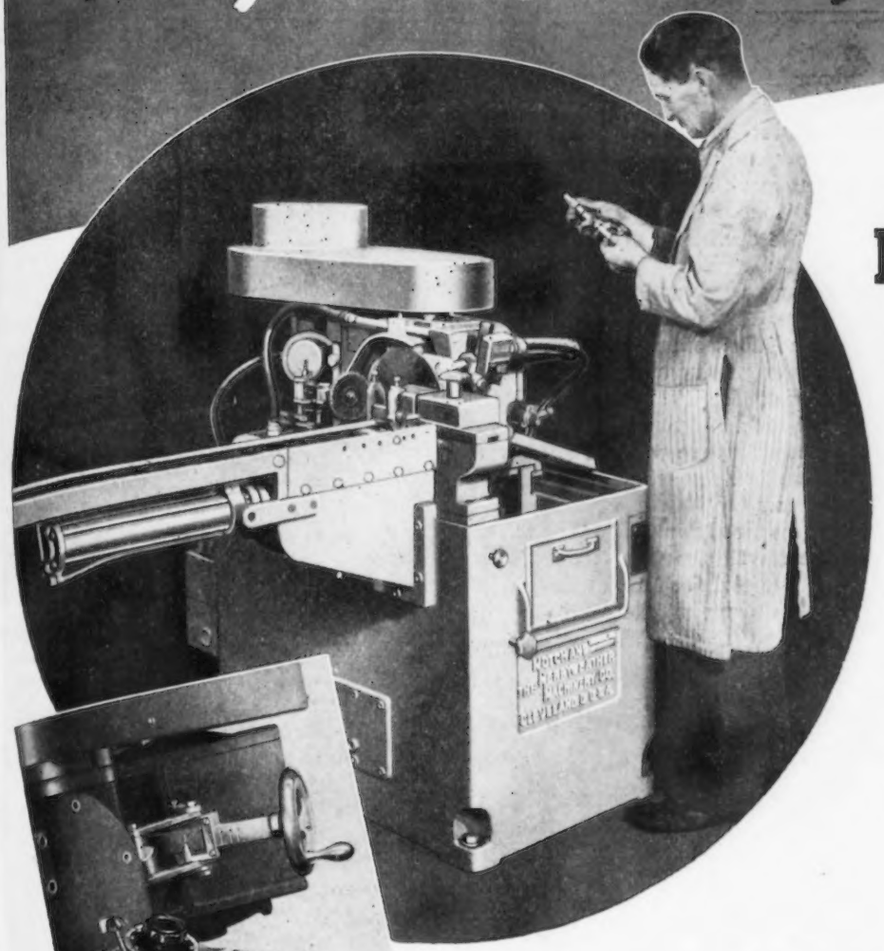

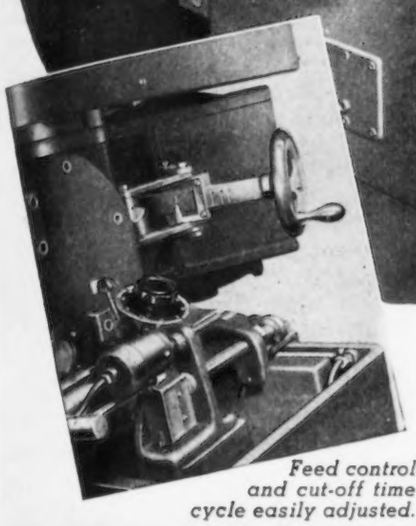

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For more information write for our well illustrated Bulletin X-700.

Only M & M builds ALL 3: CIRCULAR SAW SAW BLADE BLADE GRINDER

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NONFERROUS METALS

. . . News and Market Activities

Lead

• • • **The pressure for** deliveries of lead is off to some extent as practically all consumers are able to obtain their full requirements from major producers. Even those consumers such as paint manufacturers and tetraethyl lead manufacturers who would like to obtain more lead to expand their operations are not complaining; but more metal would permit them to put on a third shift. Production figures will be down for the summer months when reports are in due to the danger of burning out the bags in the bag house when the blast furnaces are operated at peak capacity in the hot weather. Moreover, the labor force prefers to go to work in the fields in the summer months. However, current high prices have caused all producers to step up their production during the early part of the year to record tonnages. Large tonnages are coming in from Mexico and Canada, and somewhat smaller tonnages from Australia. The present market gives no evidence of impending weakness in price for the next few months.

•

Copper

• • • **The copper market** remains firm at the 21.50¢ price. It is expected by producers that firmness will continue at least for the next several months. Some wire mills it is understood are willing to pay ¼¢ premium for deliveries of nearby copper. However it is the impression of the trade that the wire mills are attempting to get out all possible production on their backlog of orders before any marked change in business conditions would be likely to affect their order books. The difficulty in supplying all current wire mill requirements in copper is due to the shortage of wire bar facilities at refineries. July deliveries of copper are expected to show an appreciable decline from May peak deliveries of nearly 123,000 tons. This will be largely due to the decline in brass mill requirements resulting from their smaller order volume and the vacation shutdowns during July. Foreign demand for copper is spotty according to producers. Italy is in the market for 17,000 tons of blister and 20,000 tons of electrolytic. Producers are of the opinion that there is some chance of their obtaining the blister as dollar credits are assured for this tonnage. The electrolytic tonnage is not likely to be obtained for lack of dollars. The copper scrap market firmed up last week although mill and smelter buying has not been renewed on a large scale. The copper futures market opened on Tuesday this week at the Commodity Exchange in New York.

•

Cadmium

• • • **Although there** is still a limited supply of cadmium to meet current requirements, producers indicate that the pressure for deliveries is easing up somewhat in recent weeks. Observers are under the impression that pipelines are filling up and that there have been cutbacks in consumption in certain fields. It is apparent that this is true in the case of cadmium for bearings.

Develops Two Processes For Alumina Recovery

Washington

• • • **Intensive research** by the Bureau of Standards during the war resulted in development of two processes for the recovery of alumina from domestic common clays, it has been revealed.

One process involves hydrochloric acid extraction. This process has been completed but in view of the present high cost, about twice that for processing imported bauxite, work is still going ahead for ways and means of reducing cost figures and adapting pilot plant processes to commercial production.

The other process is a development of alkaline extraction with a solution containing a mixture of sodium hydroxide and sodium chloride. This method did not reach the pilot plant stage until late 1943.

Development of the acid process was hampered until development of modern plastics which, with glass and refractory materials, were substituted for metals.

"Alumina thus obtained," says the Bureau, "has an average purity of 99.8 pct, leaving insignificant impurities of chlorine, iron oxide and silica. The 0.1 pct chlorine content can be further reduced by longer treating at higher temperatures while the iron oxide can be reduced by additional washing."

British Producers Ask For London Exchange

London

• • • **The British** Non-Ferrous Metals Fed. is to make representations to the Government for the reopening of the London Metal Exchange. At the Federation's annual meeting, Mr. H. W. Clarke, the president, said the industry was concerned about the continuance of bulk purchasing, and considered that the time was approaching when the ban might be lifted from the London Metal Exchange. Before that was done the industry would wish to be assured of adequate safeguards to prevent undue speculation and exploitation of the consumer.

Nonferrous Metals Prices

Cents per pound

	July 9	July 10	July 11	July 12	July 14	July 15
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	80.00	80.00	80.00	80.00	80.00	80.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb) 15.00
Aluminum pig, f.o.b. shipping point 14.00
Antimony, American Laredo Tex.. 33.00
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be....$17.00
Beryllium aluminum, 5% Be; dollars per lb contained Be $27.50
Cadmium, del'd $1.75
Cobalt, 97-99% (per lb) ..$1.65 to $1.72
Copper, electro, Conn. Valley 21.50
Copper, lake, Conn. Valley 21.625
Gold, U. S. Treas., dollars per oz.. $35.00
Indium, 99.8%, dollars per troy oz. $2.25
Iridium, dollars per troy oz. .. $80 to $90
Lead, St. Louis 14.80
Lead, New York 15.00
Magnesium, 99.8+% 20.50
Magnesium, sticks, carlots 36.00
Mercury, dollars per 76-lb flask, f.o.b. New York.....$85.00 to $87.00
Nickel, electro, f.o.b. New York.... 37.67
Palladium, dollars per troy oz. $24.00
Platinum, dollars per troy oz...$53 to $56
Silver, New York, cents per oz.... 64.75
Tin, Straits, New York..... 80.00
Zinc, East St. Louis 10.50
Zinc, New York 11.005
Zirconium copper, 6 pct Zr, per lb contained Zr $8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot
No. 115 ..... 18.00
No. 120 ..... 17.50
No. 123 ..... 17.00
80-10-10 ingot
No. 305 ..... 22.00
No. 315 ..... 20.00
88-10-2 ingot
No. 210 ..... 27.75
No. 215 ..... 26.25
No. 245 ..... 20.25
Yellow ingot
No. 405 ..... 14.50
Manganese Bronze
No. 421 ..... 16.50

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:
0.30 copper, max. 15.75
0.60 copper, max. 15.50
Piston alloys (No. 122 type)..... 13.75
No. 12 alum. (No. 2 grade)..... 13.25
108 alloy 13.50
195 alloy 14.25
AXS-679 ..... 13.75
Steel deoxidizing aluminum, notch-bar, granulated or shot
Grade 1—95 pct-97½ pct 14.50
Grade 2—92 pct-95 pct..... 12.50
Grade 3—90 pct-92 pct..... 11.75
Grade 4—85 pct-90 pct..... 11.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed
Cast, oval, 15 in. or longer..... 37¾
Electrodeposited 32¾
Rolled, oval, straight, delivered.. 32⅞
Brass, 80-20, frt allowed
Cast, oval, 15 in. or longer 33⅜
Zinc, Cast, 99.99 ..... 18¾
Nickel, 99 pct plus, frt allowed
Cast 51
Rolled, depolarized 52
Silver 999 fine
Rolled, 1000 oz. lots, per troy oz. 67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 43.00
Copper sulphate, 99.5, crystals, bbls 11.50
Nickel salts, single, 425 lb bbls, frt allowed 14.50
Silver cyanide, 100 oz. lots, per oz. 54.00
Sodium cyanide, 96 pct, domestic, 200 lb drums 15.00
Zinc cyanide, 100 lb drums.... 34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed 7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75.

Round Rod: M, diam, in., ¼ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢ 38 to 40, 75.5¢ 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢ 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l. 15.50
Ribbon, ton lots 14.50
Plates
Small 13.50
Large, over 12 in. 14.50

Copper, Brass, Bronze

(Cents per pound, f.o.b. mill effective June 11)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled		30.03	....
Copper, drawn..		31.03	....
Low brass	34.04*	31.07	31.38
Yellow brass....	32.39*	29.32	29.63
Red brass	34.65*	31.68	31.99
Naval brass	29.56	28.31	34.25
Leaded brass ..	27.98	24.39	30.13
Commercial bronze	35.52*	32.80	33.11
Manganese bronze	33.14	31.64	37.75
Phosphor bronze, 5 pct.	53.25*	52.25	52.00
Muntz metal ...	29.17	27.92	32.36
Everdur, Herculoy, Olympic, etc...	37.07	35.57	38.44
Nickel silver, 5 pct.	41.20	40.28	38.67
Architectural bronze	27.94	....	....

*Seamless tubing.

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of less than 15,000 lb.)

Cartridge brass turnings 14¼
Loose yellow brass trimmings..... 15⅛

Copper and Brass

No. 1 heavy copper and wire.. 14½—15
No. 2 heavy copper and wire.. 13½—14
Light copper ..... 12½—13
Auto radiators (unsweated) 8½— 9
No. 1 composition ..... 10½—11
No. 1 composition turnings... 10 —10⅛
Clean red car boxes..... 9 — 9½
Cocks and faucets ..... 9 — 9½
Mixed heavy yellow brass.... 7 — 7¼
Old rolled brass ..... 7 — 7¼
Brass pipe ..... 8½— 9
New soft brass clippings..... 10½—11
Brass rod ends ..... 9½—10
No. 1 brass rod turnings..... 8½— 9

Aluminum

Alum. pistons free of struts.. 4 — 4½
Aluminum crankcases ..... 5 — 5½
2S aluminum clippings..... 7 — 7⅛
Old sheet & utensils..... 5½— 6
Mixed borings and turnings.. —2
Misc. cast aluminum..... 5 — 5½
Dural clips (24S) ..... 5 — 5½

Zinc

New zinc clippings ..... 6 — 6½
Old zinc ..... 4¼— 4½
Zinc routings ..... 1½— 2
Old die cast scrap ..... 2½— 3

Nickel and Monel

Pure nickel clippings ..... 15½—17½
Clean nickel turnings ..... 14 —15
Nickel anodes ..... 16 —17
Nickel rod ends ..... 17 —18
New Monel clippings ..... 10 —10½
Clean Monel turnings ..... 7 — 8
Old sheet Monel ..... 9½—10
Old Monel castings..... 7½— 8
Inconel clippings ..... 8 — 8½
German silver clippings, mixed 7½— 8
German silver turnings, mixed 5½— 6

Lead

Soft scrap lead ..... 10 —10⅛
Battery plates (dry) ..... 5 — 5⅛

Magnesium Alloys

Segregated solids 8
Castings 5

Miscellaneous

Block tin ..... 63 —65
No. 1 pewter ..... 50 —52
No. 1 auto babbitt ..... 38 —40
Mixed common babbitt ..... 11½—12
Solder joints ..... 12 —13
Siphon tops ..... 38 —39
Small foundry type ..... 13 —13½
Monotype ..... 12 —12½
Lino and stereotype ..... 11½—12
Electrotype ..... 10 —10½
New type shell cuttings .... 10½—11
Clean hand picked type shells 4½— 5
Lino and stereo dross ..... 5 — 5½
Electro dross ..... 3 — 3¼

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.
Full lead sheets 18.25
Cut lead sheets 18.75
Lead pipe, manufacturing point... 17.50
Lead traps and bends .....List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules ....List +42%
Lead wool 19.50

SCRAP

. . . News and Market Activities

Inflation Hits Scrap Market; Prices Zoom

New York

• • • **Exhibiting every evidence** of an inflationary trend, the scrap market this week zoomed to within $1.92 a gross ton of the high for the year reached in the week of Mar. 18. THE IRON AGE scrap composite this week for No. 1 heavy melting steel advanced from $35.58 to $37.75, a jump of $2.17 a ton.

With many consumers still out of the market and apparently fearful of what prices they may have to pay, other scrap users stepped in this week and bought representative tonnages which caused the market to go higher in practically every area. Railroad sales a week ago had set the stage for the heavy melting grade upward trend this week.

At Pittsburgh a tonnage of No. 1 heavy melting steel sold to a consumer brought at least $39 a ton, an advance of $3 over the market a week ago. At Philadelphia new sales raised the market there 50¢ a ton. More striking were advances at Buffalo of $7 a ton; at Youngstown, $5 a ton; at Cleveland, $4.50 a ton; and at Chicago, $3 a ton. The New York market for No. 1 heavy melting steel advanced $1.75 a ton and Cincinnati showed a rise of $2 a ton.

Brokers and dealers all over the country were being hit hard as they paid much higher prices to cover on all orders priced at several dollars below the current market. There was no evidence this week that consumers were bidding against each other for remote material. There was little remote material for each district was doing its utmost to keep its scrap in its own bailiwick.

•

PITTSBURGH—For the past 3 weeks brokers have been answering a "margin call" on scrap, forcing deliveries on short sales and bringing brokers offering prices higher than the best offered by consumers until Monday of this week when a $39 a ton local sale was made in this area. This jump in the market will likely bring other consumers in, but the fact that many are comfortable may keep them out until August. Brokers that have undelivered low-priced orders will have to pay proportionately more to cover as a result of this upward surge in price—and the majority of brokers still have orders to fill. Remote scrap is spoken of in whispers now, consumers fearing to openly compete in out-of-district markets, because of the possibility of another dog fight for this material. Ingot deals are still common, according to informed sources. The trend on railroad scrap has been toward higher prices, with B&O last week bringing up to $41 to $42 a ton for heavy melting and $45 to $46 a ton for specialties. The Pennsylvania R.R. has a list this week to be sold and scrap interests anticipate that the top for railroad scrap has not yet been reached.

•

CHICAGO — Sales made at the new prices last week only partially reflect the strength of the market. Although out-of-district scrap purchases are again being made, the overall tonnage so bought as yet remains small. Two Chicago brokers have been buying in the Southwest for at least two local mills at a $40 delivered Chicago price. Scrap users in the Southwest report this is an open order proposition. Many brokers and dealers are still covering old orders, and some have not yet been able to secure enough scrap to meet their previous commitments. Railroad heavy melting and specialties once more brought even higher prices. The mills who are still attempting to hold the market are pushing their scrap arrangement with their customers to the limit.

•

PHILADELPHIA — The market here was stronger last week with mills buying heavy melting grades at $38 and without any differential between grades. A sale of shoveling turnings at $32 marked the first market action in recent months to bring this grade above machine shop. Cast grades are up again this week but the most significant advance was in railroad malleable in which sales were reported at $57. Low phos and railroad specialties are also selling higher.

•

NEW YORK—The market reflected the stronger trend in other areas with the price increases expected last week now in evidence. Brokers were watching the market closely for possible further increases as the heavy melting grades advanced to $34, up $2 from last week.

•

DETROIT—The Detroit market continues to show strength with large mill buyers paying $35.50 delivered for open-hearth grades and a premium of $2 for scrap originating out of state. Partly in response to the recent climb of open-hearth grades, the price of turnings and borings has advanced slowly this week. Cast grades are again strong after a period in which buying was spotty and the market had exhibited erratic tendencies.

CLEVELAND — Brokers buying prices here and in the Valley have advanced to a point where they are practically leading the market. In covering old orders at fancy prices, brokers are paying $39.50 in the Valley. One major consumer bought here for a reported $38, which was some relief, a price which probably will not check the market. Dealers are shying away from orders and indications are that there is less scrap than before the last price spree. Brokers have been taking a real beating without crying.

•

BOSTON—Aside from an occasional car of shoveling and machine shop turnings, mixed borings and turnings and cast, the market is at a standstill with vacations uppermost in the minds of brokers and yardsmen. Cast for outside New England delivery is $43.50 a ton bid and heavy breakable for Pennsylvania delivery $39 bid with no sellers.

•

BUFFALO — Announcement of the coal pack blew the lid off the market and steelmaking scrap soared $6 a ton last week. The orders were not exceptionally large but they came from one of the leading interests and were spread across the board. Heavy melting sold at $38 to $39 and one of the leading dealers quoted $39 to $40 for strictly No. 1, a premium of $2 over No. 2 steel and hydraulic bundles. Cast scrap and rail specialties advanced $2 to $3 in sympathy but the demand was slow. Water receipts picked up 5000 tons arriving by lake from Duluth and about 8000 tons by canal from New York.

•

ST. LOUIS—Increased capacity of consumers in the district and sharper competition from outside markets for scrap available in this area has caused a shortage of material. Mills locally are trying to meet the outside competition and are advancing their buying prices which are still below those being paid in other areas. No. 1 is up $2 per ton.

•

CINCINNATI—The local iron and steel scrap market rules stronger with prices on most steel items up $2. While foundries are not too active in the market, mills generally are taking about all the scrap they can get. Supply still is far from adequate but dealers and brokers indicate that requirements are being met and some inventory is being built.

•

TORONTO—Canadian scrap iron and steel markets have fallen into the doldrums. No hoarding is reported, in fact most dealers are depending on daily receipts to keep their yard workers going. Prices continue to come under criticism from most quarters.

•

BIRMINGHAM — Scrap prices registered a big boost with resumption of coal mining and due to general scarcity in this section. Scrap is reported moving to Pittsburgh and other sections.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.00
RR. hvy. melting	41.00 to 42.00
No. 2 hvy. melting	38.50 to 39.00
RR. scrap rails	42.00 to 43.00
Rails 2 ft. and under	46.50 to 47.00
No. 1 comp'd bundles	38.50 to 39.00
Hand bdld. new shts.	38.50 to 39.00
Hvy. axle turn.	38.00 to 38.50
Hvy. steel forge turn.	38.00 to 38.50
Mach. shop turn.	31.00 to 32.00
Shoveling turn.	32.50 to 33.00
Mixed bor. and turn.	31.00 to 32.00
Cast iron borings	31.50 to 32.50
No. 1 cupola cast	38.00 to 38.50
Hvy. breakable cast	37.00 to 37.50
Malleable	51.00 to 52.00
RR. knuck and coup.	45.00 to 46.00
RR. coil springs	45.00 to 46.00
RR. leaf springs	45.00 to 46.00
Rolled steel wheels	45.00 to 46.00
Low phos.	41.50 to 42.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$36.50 to $37.00
No. 2 hvy. melting	35.50 to 36.00
No. 1 bundles	36.50 to 37.00
No. 2 dealers' bundles	35.50 to 36.00
Bundled mach. shop turn.	35.50 to 36.00
Galv. bundles	33.50 to 34.00
Mach. shop turn.	32.50 to 33.00
Short shov. turn.	34.50 to 35.00
Cast iron borings	33.50 to 34.00
Mix. borings & turn.	32.50 to 33.00
Low phos. hvy. forge	41.00 to 42.00
Low phos. plates	39.00 to 39.50
No. 1 RR. hvy. melt.	40.00 to 41.00
Rerolling rails	45.00 to 46.00
Miscellaneous rails	41.50 to 42.00
Angles & Splice bars	43.00 to 44.00
Locomotive tires, cut	43.00 to 44.00
Cut bolster & side frames	43.00 to 44.00
Standard stl. car axles	45.00 to 46.00
No. 3 steel wheels	42.00 to 43.00
Couplers & knuckles	45.00 to 45.50
Malleable	57.00 to 58.00
No. 1 mach. cast.	45.00 to 46.00
Rails 2 ft. and under	45.00 to 46.00
No. 1 agricul. cast.	40.50 to 41.00
Hvy. breakable cast.	35.00 to 36.00
RR. grate bars	39.00 to 39.50
Cast iron brake shoes	41.00 to 41.50
Cast iron carwheels	43.00 to 44.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	34.00 to 35.00
No. 2 bundles	34.00 to 35.00
Mach. shop turn.	28.00 to 29.00
Shoveling turn.	30.00 to 31.00
Cast iron borings	29.00 to 30.00
Mixed bor. & turn.	28.00 to 29.00
Low phos. plate	41.00 to 42.00
No. 1 cupola cast	46.00 to 47.00
Hvy. breakable cast.	37.00 to 38.00
Scrap rails	40.00 to 41.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	31.00 to 32.00
Nos. 1 and 2 bundles	31.00 to 32.00
Busheling	31.00 to 32.00
Shoveling turn.	26.00 to 27.00
Machine shop turn.	24.00 to 25.00
Mixed bor. & turn.	24.00 to 25.00
Cl'n cast. chem. bor.	25.00 to 26.00
No. 1 machinery cast	43.50 to 47.00
No. 2 machinery cast.	43.50 to 47.00
Heavy breakable cast.	39.00 to 45.00
Stove plate	43.50 to 47.00

DETROIT

Per gross ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$33.75 to $34.25
No. 2 hvy. melting	33.75 to 34.25
No. 1 bundles	33.75 to 34.25
New busheling	33.75 to 34.25
Flashings	33.75 to 34.25
Mach. shop turn.	25.50 to 26.00
Shoveling turn.	26.50 to 27.00
Cast iron borings	26.50 to 27.00
Mixed bor. & turn.	26.50 to 27.00
Low phos. plate	35.25 to 35.75
No. 1 cupola cast.	39.00 to 40.00
Hvy. breakable cast.	29.00 to 31.00
Stove plate	32.00 to 34.00
Automotive cast.	38.00 to 40.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.50 to $38.00
No. 2 hvy. melting	37.50 to 38.00
No. 1 bundles	37.50 to 38.00
No. 2 bundles	37.50 to 38.00
Mach. shop turn.	29.50 to 30.00
Shoveling turn.	31.00 to 32.00
Mixed bor. & turn.	27.00 to 28.00
Clean cast chemical bor.	31.00 to 33.00
No. 1 cupola Cast.	47.00 to 48.00
Hvy. breakable cast.	45.00 to 46.50
Cast. charging box	45.00 to 46.50
Clean auto cast.	47.00 to 48.00
Hvy. axle forge turn.	38.00 to 39.00
Low phos. plate	41.50 to 42.00
Low phos. punchings	41.50 to 42.00
Low phos. bundles	40.50 to 41.50
RR. steel wheels	42.00 to 43.00
RR. coil springs	42.00 to 43.00
RR. malleable	55.00 to 57.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$34.50 to $35.50
No. 2 hvy. melting	30.00 to 31.00
Bundled sheets	30.00 to 31.00
Mach. shop turn.	25.00 to 26.00
Locomotive tires, uncut	37.50 to 38.50
Mis. std. sec. rails	37.00 to 38.00
Rerolling rails	43.00 to 45.00
Steel angle bars	38.00 to 39.00
Rails 3 ft. and under	40.00 to 41.00
RR. steel springs	40.50 to 41.50
Steel car axles	40.50 to 41.50
Stove plate	34.00 to 35.00
Grate bars	34.00 to 35.00
Brake shoes	38.00 to 39.00
Malleable	55.00 to 56.00
Cast iron car wheels	40.00 to 41.00
No. 1 machinery cast.	41.00 to 42.00
Hvy. breakable cast	35.00 to 36.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.50 to $33.00
No. 2 hvy. melting	32.50 to 33.00
No. 2 bundles	32.50 to 33.00
No. 1 busheling	32.50 to 33.00
Long turnings	22.50 to 23.00
Shoveling turnings	24.00
Cast iron borings	23.00
Bar crops and plate	36.00
Structural and plate	36.00 to 37.00
No. 1 cast	41.00
Stove plate	38.50 to 39.00
No. 1 RR. hvy. melt.	42.00 to 42.50
Steel axles	36.50 to 37.00
Scrap rails	38.50 to 39.00
Rerolling rails	36.00 to 37.00
Angles & splice bars	38.00 to 39.00
Rails 3 ft. & under	38.00 to 39.00
Cast iron carwheels	35.00 to 36.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	39.00 to 40.00
Mach. shop turn.	33.00 to 34.00
Short shov. turn.	34.00 to 35.00
Cast iron borings	34.00 to 35.00
Low phos.	43.00 to 43.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	33.50 to 34.00
No. 2 hvy. melting	33.50 to 34.00
No. 2 bundles	33.50 to 34.00
Comp. galv. bundles	33.50 to 34.00
Mach. shop turn.	24.50 to 25.00
Mixed bor. & turn.	24.50 to 25.00
Shoveling turn.	26.50 to 27.00
No. 1 cupola cast	39.00 to 40.00
Hvy. breakable cast.	37.00 to 38.00
Charging box cast.	37.50 to 38.50
Stove plate	37.50 to 38.50
Clean auto cast.	39.00 to 40.00
Unstrip. motor blks.	35.00 to 36.00
Cl'n chem. cast bor.	25.00 to 25.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	38.00 to 39.00
No. 1 busheling	38.00 to 39.00
Mach. shop turn.	28.00 to 29.00
Shoveling turn.	30.00 to 31.00
Cast iron borings	28.00 to 29.00
Mixed bor. & turn.	28.00 to 29.00
No. 1 cupola cast.	38.00 to 40.00
Charging box cast.	33.00 to 35.00
Stove plate	35.00 to 38.00
Clean auto cast.	38.00 to 40.00
Malleable	39.00 to 41.00
Low phos. plate	38.00 to 40.00
Scrap rails	37.00 to 38.00
Rails 3 ft. & under	40.00 to 42.00
RR. steel wheels	40.00 to 42.00
Cast iron carwheels	40.00 to 42.00
RR. coil & leaf spgs.	40.00 to 42.00
RR. knuckles & coup.	40.00 to 42.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $38.50
No. 2 hvy. melting	38.00 to 38.50
Compressed sheet stl.	38.00 to 38.50
Drop forge flashings	38.00 to 38.50
No. 2 bundles	38.00 to 38.50
Mach. shop turn.	32.00 to 33.00
Shoveling turn.	33.00 to 34.00
No. 1 busheling	38.00 to 38.50
Steel axle turn.	38.00 to 38.50
Cast iron borings	33.00 to 34.00
Mixed bor. & turn.	32.00 to 32.50
Low phos.	40.00 to 41.00
No. 1 machinery cast.	43.00 to 45.00
Malleable	54.00 to 55.00
RR. cast.	43.00 to 45.00
Railroad grate bars	38.00 to 39.00
Stove plate	39.00 to 40.00
RR. hvy. melting	38.00 to 39.00
Rails 3 ft. & under	44.00 to 45.00
Rails 18 in. & under	45.00 to 46.00

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
Elec. furn. 1 ft. und.	25.00
No. 1 cupola cast.	$32.00 to 33.00
RR. hvy. melting	20.50

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 1 bales	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	14.50
No. 1 cupola cast.	$32.00 to 33.00
RR. hvy. melting	20.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$20.00
Elec. furn. 1 ft. und.	$23.50 to 25.00
No. 1 cupola cast.	27.50 to 29.00
RR. hvy. melting	21.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	30.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

* Ceiling price.

Comparison of Prices . .

Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	July 15, 1947	July 8, 1947	June 17, 1947	July 16, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.425
Cold-rolled sheets	3.20	3.20	3.20	3.275
Galvanized sheets (10 ga.)	3.55	3.55	3.55	4.05*
Hot-rolled strip	2.50	2.50	2.50	2.35
Cold-rolled strip	3.20	3.20	3.20	3.05
Plates	2.65	2.65	2.65	2.50
Plates, wrought iron	5.95	5.95	5.95	4.112
Stain's c-r strip (No. 302)	30.30	30.30	30.30	30.30
*24 ga				
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.50
Cold-finished bars	3.20	3.20	3.20	3.10
Alloy bars	3.05	3.05	3.05	2.92
Structural shapes	2.50	2.50	2.50	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	25.97
Wrought iron bars	6.15	6.15	6.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.30	3.05
Wire nails	3.75	3.75	3.75	3.75
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.39*
Light rails	2.85	2.85	2.85	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$42.00	$39.00
Sheet bars	50.00	50.00	50.00	38.00
Slabs, rerolling	42.00	42.00	42.00	39.00
Forging billets	50.00	50.00	50.00	47.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.55	2.30
Skelp	2.35	2.35	2.35	2.05

Pig Iron: (per gross ton)	July 15, 1947	July 8, 1947	June 17, 1947	July 16, 1946
No. 2, foundry, Phila.	$36.51	$36.51	$36.51	$28.34
No. 2, Valley furnace	33.50	33.50	33.50	26.50
No. 2, Southern, Cin'ti	34.75	34.75	34.75	28.94
No. 2, Birmingham	29.88	29.88	29.88	24.88
No. 2, foundry, Chicago†	33.00	33.00	33.00	26.50
Basic, del'd Philadelphia	*36.00*	36.92	36.92	27.84
Basic, Valley furnace	**33.00**	33.00	33.00	26.00
Malleable, Chicago†	33.50	33.50	33.50	26.50
Malleable, Valley	33.50	33.50	33.50	26.50
Charcoal, Chicago	45.99	45.99	45.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$38.75	$35.75	$34.75	$20.00
Heavy melt'g steel, Phila.	37.75	37.25	33.75	18.75
Heavy melt'g steel, Ch'go	36.75	33.75	31.25	18.75
No. 1, hy. comp. sheet, Det.	34.00	33.25	30.00	17.32
Low phos., Youngs'n	43.25	38.75	35.75	22.50
No. 1, cast, Pittsburgh	38.25	36.50	36.50	20.00
No. 1, hy. comp. sheet, Det.	34.00	33.25	20.00	17.32
No. 1, cast, Chicago	45.50	45.50	43.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.00	$10.50	$10.50	$8.75
Foundry coke, prompt	13.75	11.25	11.25	9.85
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	21.50	14.375
Copper, Lake, Conn.	21.625	21.625	21.625	14.375
Tin, Straits, New York	80.00	80.00	80.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	9.50
Lead, St. Louis	14.80	14.80	14.80	9.50
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when the actual data of shipments for this quarter are compiled.

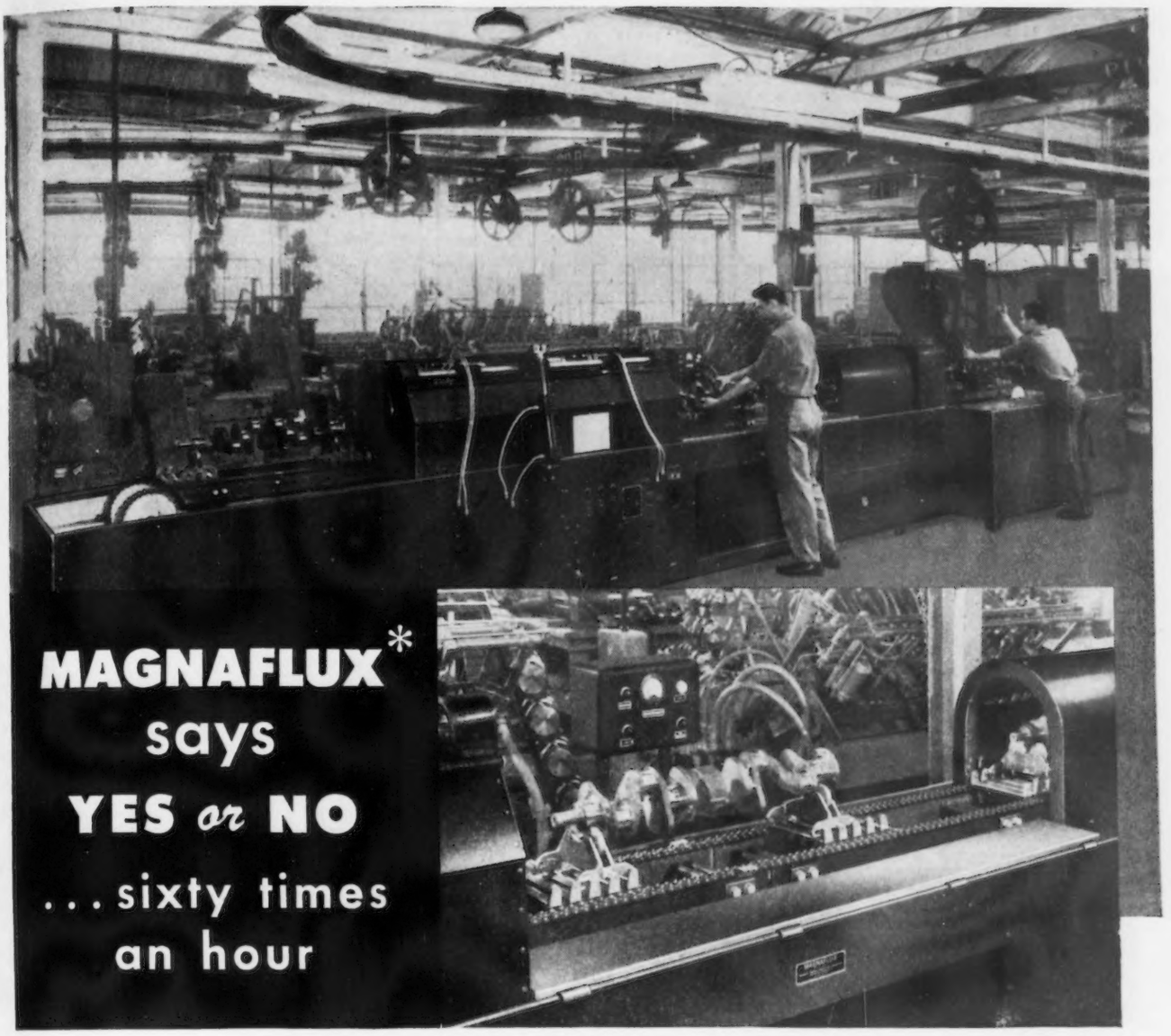
	FINISHED STEEL	PIG IRON	SCRAP STEEL
July 15, 1947	2.85664¢ per lb.	$33.15 per gross ton	$37.75 per gross ton
One week ago	2.85664¢ per lb.	$33.15 per gross ton	$35.58 per gross ton
One month ago	2.85664¢ per lb.	$33.15 per gross ton	$33.25 per gross ton
One year ago	2.73011¢ per lb.	$26.45 per gross ton	$19.17 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1947	2.85664¢	2.85664¢	$33.15 Mar. 11	$30.14 Jan. 7	$39.67 Mar. 18	$29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 66 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



Magnaflux automatic unit in automotive plant for continuous inspection of heavy duty crankshafts includes stations for loading, inspection (inset) and unloading; magnetizing and de-magnetizing tunnels, and a continuous motion conveyor through unit. Capacity is 60 crankshafts per hour of as many as 40 varieties.

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NEW YORK • LOS ANGELES • DETROIT • DALLAS • CLEVELAND • BIRMINGHAM

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound of dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. (8) Also shafting. For quantities of 20,000 lb to 89,999 lb. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices: Includes 3 pct freight tax. (15) 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Some sales are at higher prices. (17) Delivered Los Angeles; add ½¢ per 100 lb for San Francisco.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00	(Canton = $52.00)													
BILLETS, BLOOMS, SLABS							(Provo = $53.20)								
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00					$45.00		
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	(Provo = $61.20, Duluth = $52.00[13]) $50.00						$53.00		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton = $61.00)						$64.00		
SHEET BARS							$53.00		Portsmouth, Ohio = $67.20						
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville = 2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢		(Worcester = 2.65¢)					3.27¢[13]			
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢		3.24¢[17]	2.65¢	2.79¢	2.70¢
Cold-rolled[1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.35¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢			4.32¢[17]		3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.70¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled[3]	2.50¢	2.50¢	2.50¢	2.50¢[15]	2.50¢		2.50¢						2.65¢	2.93¢	2.88¢
Cold-rolled[4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester = 3.40¢)			3.35¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							3.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85		(Warren, Ohio = $5.75)			$6.157	$6.062[11]
Electro, box 0.25 lb.	Deduct 90¢ from standard coke base box price.														
Electro, box 0.50 lb.	Deduct 70¢ from standard coke base box price.														
Electro, box 0.75 lb.	Deduct 50¢ from standard coke base box price.														
BLACKPLATE, 29 gage[5]	3.60¢	3.60¢	3.60¢		3.70¢			3.70¢	3.70¢		(Warren, Ohio = $5.75)		3.99¢	3.90¢	
BLACKPLATE, CANMAKING															
55 lb. to 70 lb.	Deduct $1.55 from standard coke base box.														
75 lb. to 95 lb.	Deduct $1.65 from standard coke base box.														
100 lb. to 118 lb.	Deduct $1.55 from standard coke base box.														
TERNES, MFG., Special coated	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢					3.285¢	2.75¢	3.01¢	2.98¢
Rail steel[6, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢									
Reinforcing (billet)[7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢				2.985¢		2.74¢	2.65¢
Reinforcing (rail)[7, 16]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢								
Cold-finished[8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢							3.35¢	3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton = 3.05¢)					3.20¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.95¢		
PLATE								(Coatesville = 2.80¢, Claymont = 2.90¢, Geneva, Utah = 2.80¢)							
Carbon steel[12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	2.65¢				3.46¢[14]		2.87¢	2.85¢
Floor plates	3.90¢	3.90¢												4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville = 4.10¢)									4.01¢	3.895¢
SHAPES, Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Geneva, Utah = 2.65¢)		(Bethlehem = 2.50¢)			3.17¢[10]		2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.40 carbon	3.20¢			3.20¢			(Worcester = 3.40¢)								
0.41 to 0.60 carbon	4.70¢			4.70¢			(Worcester = 4.90¢)								
0.61 to 0.80 carbon	5.30¢			5.30¢			(Worcester = 5.50¢)								
0.81 to 1.00 carbon	6.80¢			6.80¢			(Worcester = 7.00¢)								
Over 1.00 carbon	9.10¢			9.10¢			(Worcester = 9.30¢)								
MANUFACTURERS' WIRE[9]															
Bright	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester = 3.40¢, Duluth = 3.35¢)					4.31¢[13]		3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢	(Worcester = 4.35¢, Duluth = 4.50¢)					(Trenton = 4.50¢)		5.28¢[13]		4.66¢	4.595¢
PILING, Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.36¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo		Base per lb
18	4	1	—		74¢
1.5	4	1.5	8		59¢
6	4	2	6		63¢
High-carbon-chromium*					47¢
Oil hardening manganese*					26¢
Special carbon*					24¢
Extra carbon*					20¢
Regular carbon*					16¢

Warehouse prices on and east of Mississippi are 2¢ per lb. higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.75¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	3.45

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio; Weirton, W. Va.; St. Louis, Kansas City, Minnequa, Colo.; Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	•24.00	•22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

• Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	Delivered San Francisco
Standard, galvanized and coated nails	$3.75†	$4.83
Cut nails, carloads, Pittsburgh base	5.30	....

†10¢ additional at Cleveland, 30¢ at Worcester.

	Base per 100 lb	
Annealed fence wire	$3.95‡	$4.96
Annealed galv. fence wire	4.40‡	5.41

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base	column
Woven wire fence*	84	107
Fence posts, carloads	90††	...
Single loop bale ties	86	110
Galvanized barbed wire**	94	114
Twisted barbless wire	90	...

• 15½ gage and heavier. •• On 80-rod spools in carload quantities. ††Pittsburgh, Duluth.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Repub-lic	Carnegie-Illinois, Republic	Repub-lic	Alan Wood	Inland	Bethle-hem	Jones & Laughlin	Youngs-town Sheet & Tube	Great Lakes Steel
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10
Sheets									
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85
Cold-rolled	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75	4.75
Galvanized	....	5.40	....	....	....	5.40	....	....	....
Strip									
Hot-rolled	3.85	3.85	3.85	....	3.85	3.85	3.85	3.85	3.85
Cold-rolled	....	....	4.75	....	....	4.75	4.75	4.75	4.75†
Shapes	....	3.85	....	....	3.85	3.85	3.85	3.85	....
Beams	....	3.85	....	....	....	3.85	....	....	....
Bars									
Hot-rolled	4.00	4.00	4.00	....	....	4.00	4.00	4.00	4.00
Cold-rolled	....	....	....	....	....	....	....	4.60	....
Bar shapes	....	4.00	....	....	4.00	4.00	4.00	4.00	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

***Base discounts.** F.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only*

Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	55½	41
¼-in.	58½	45
1 to 3-in.	60½	47½
Wrought Iron, buttweld		
⅛ in.	2	+30
¼-in.	11½	+10
1 and 1¼-in	17	+ 2
1½-in.	22½	1½
2-in.	23	2
Steel, lapweld		
2-in.	53	39½
2½ and 3-in.	56	42½
3½ to 6-in.	58	44½
Steel, seamless		
2-in.	52	38½
2½ and 3-in.	55	41½
3½ to 6-in.	57	43½
Wrought Iron, lapweld		
2-in.	14½	+ 5½
2½ to 3½-in.	17	+ 1½
4-in.	21	4
4½ to 8-in.	19	2½

Extra Strong, plain ends

Steel, buttweld		
½-in.	54½	41½
¾-in.	58½	45½
1 to 3-in.	60	48
Wrought Iron, buttweld		
½-in.	6½	+14
¾-in.	12½	+ 8
1 to 2-in.	22	2
Steel, lapweld		
2-in.	52	39½
2½ and 3-in.	56	43½
3½ to 6-in.	59½	47
Steel, seamless		
2-in.	51	38½
2½ and 3-in.	55	42½
3½ to 6-in.	58½	46
Wrought Iron, lapweld		
2-in.	17½	+ 2
2½ to 4-in.	26	8½
4½ to 6-in.	22	4

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to24 ft, inclusive.

OD in In.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$15.29	$18.17	$15.00	$17.95
2½	12	20.57	24.43	20.11	24.07
3	12	22.87	27.18	22.26	26.68
3½	11	28.86	34.30	28.06	33.64
4	10	35.82	42.55	34.78	41.68

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in. del'd Chicago	$81.56
6-in. to 24-in. del'd New York	79.80
6-in. to 24-in., Birmingham	71.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	95.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	48
9/16 & ⅝ in. x 6 in. & shorter	50
All larger diam and longer lengths	47
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	40

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts *Base discount less case lots*	USS	SAE
7/16 in. and smaller		51
½ in. and smaller	50	..
½ in. through 1 in.		48
9/16 in. through 1 in.	49	..
1⅛ in. through 1½ in.	47	46
1⅝ in. and larger	40	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts *Consumer*

Packages, nuts separate	65 and 10
In bulk	75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets *(7/16 in. and smaller)*

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws *(In packages)*	*Percent Off List Consumer*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	56
¾ to 1 in. x 6 in., SAE 1035, heat treated	47
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer	$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	10¢ to 15¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	35¢ to 37¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	29¢ to 31¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200, & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	49¢
Nickel, 150 mesh	51¼¢
Silicon, 100 mesh	26¢
Solder powder, 100 mesh	8½¢ plus metal
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.90
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$11.50 to $12.50
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	13.00 to 14.50
Foundry, Byproduct	
Chicago, del'd	$17.10
Chicago, f.o.b.	16.10
New England, del'd	17.25
Seaboard, Kearney, N. J., f.o.b.	15.35
Philadelphia, del'd	15.46
Buffalo, del'd	17.25
Ashland, Ohio, f.o.b.	14.50
Painesville, Ohio, f.o.b.	14.60
Erie, del'd	16.75
Cleveland, del'd	15.90
Cincinnati, del'd	15.39
St. Louis, del'd	15.85
Birmingham, del'd	15.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 1000
First quality, Ohio	$64.00
First quality, Pa., Md., Ky., Mo.	70.00
First quality, New Jersey	75.00
Sec. quality, Pa., Md., Ky., Mo.	64.00
Sec. quality, New Jersey	59.00
Sec. quality, Ohio	56.00
Ground fire clay, net ton, bulk	10.00

Silica Brick

Pennsylvania and Birmingham	$70.00
Chicago District	79.00
Silica cement, net ton (Eastern)	12.00
East Chicago	13.00

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$59.00

Magnesite Brick

Standard, Balt. and Chester	$81.00
Chemically bonded, Baltimore	70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in bulk	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. Billmeyer, Pa., Millersville, Ohio	10.55

Midwest, add 10¢; Mo. Valley, add 20¢

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		Plates	Standard Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.14	$5.18	$5.29	$4.43	$5.28	$4.44	$4.22	$4.48	$5.13	$8.37	$8.37	$9.88	$9.88
New York	4.22	5.17[1]	5.47	4.62	5.40	4.62	4.37	4.62	5.17	8.42	8.42	9.92	9.92
Boston	4.40	5.22	4.95[12]	4.65	6.36	4.70	4.47	4.62	5.22	8.62	8.62	9.97	9.97
Baltimore	3.89	....	5.14	4.40	....	4.39	4.34	4.45	5.10	....	....	....	....
Norfolk	4.15	....	....	....	....	4.50	4.50	4.75	5.50	....	....	....	....
Chicago	3.65	....	....	4.05	5.05	4.25	4.10	4.10	4.75	8.10	8.10	9.35	9.35
Milwaukee	4.099	4.899[1]	5.249	4.199	....	4.399	4.249	4.249	4.899	8.399	8.399	9.649	9.649
Cleveland	3.95	4.55	5.238	4.188	5.00	4.25†	4.311	4.10	4.75	8.358	8.358	9.35	9.35
Buffalo	4.15	4.85[1]	5.35	4.30	5.25	4.55	4.10	4.10	4.75	8.10	8.10	9.35	9.35
Detroit	4.05	4.85	5.42	4.34	5.24	4.49†	4.42	4.20	4.87	8.51	8.51	9.74	9.74
Cincinnati	3.916	4.716	5.166	....	....	4.553	4.444	4.403	5.053	....	....	....	....
St. Louis	3.999	4.799[1]	5.424	4.199	5.424	4.399	4.249	4.249	5.074	8.574	8.574	9.824	9.824
Pittsburgh	3.95	4.65[1]	5.10	4.05	4.95	4.25	4.10	4.10	4.75	8.10	8.10	9.35	9.35
St. Paul	4.284[7]	5.064[1]	5.434[2]	4.384[7]	....	4.584[7]	4.434[7]	4.434[7]	5.476[6]	....	7.084[6]	....	....
Omaha	4.768	6.118[1]	5.918	4.868	....	5.068	4.918	4.918	5.588	....	....	....	....
Indianapolis	3.84	4.84	5.29	4.24	5.01	4.51	4.36	4.56	5.01	....	....	....	....
Birmingham	4.15[11]	....	5.25	4.15[11]	....	4.35[11]	4.10[11]	4.10[11]	5.58	....	....	....	....
Memphis	4.32[11]	5.53[11]	5.97	4.72[11]	....	4.92[11]	4.67[11]	4.67[11]	5.78	....	....	....	....
New Orleans	*4.68[11]	5.94[1]	....	4.88[11]	....	5.03[11]	*4.73[11]	*4.83[11]	5.94[6]	....	....	....	....
Los Angeles	5.15	7.00[1]	6.70	5.65	8.35[5]	5.10	5.20	5.10	6.90[14]	10.15	9.35	11.05	11.05
San Francisco	4.70[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.75[8]	7.00[10]	....	....	....	....
Seattle	4.80[4]	6.75[2]	6.30	5.30[4]	....	5.15[4]	4.95[4]	5.00[4]	7.10[14]	....	9.50[6]	....	10.85[6]
Portland	5.00[4]	....	6.25	5.50[4]	....	5.25[4]	5.10[4]	5.10[4]	7.20	....	9.30[6]	....	....
Salt Lake City	5.65	....	7.10	6.35	....	5.70	5.85	5.95	7.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 lb and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999; (12) 450 to 3749; (13) 400 to 1999; (14) 1500 and over.

* Add 46¢ for sizes not rolled in Birmingham.

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	34.00	34.50	35.00	35.50	.....	Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	.....
Birdsboro	40.00	40.50	41.00	41.50	45.00	Boston	Steelton	4.82	.....	.....	.....	.....	43.82
Birmingham	29.38	29.88	.....	.....	.....	Brooklyn	Bethlehem	3.00	37.00	37.50	38.00	38.50	.....
Buffalo	32.50	33.00	33.50	.....	.....	Brooklyn	Birdsboro	3.50	.....	.....	.....	.....	48.50
Chicago	32.50	33.00	33.50	34.00	.....	Cincinnati	Birmingham	4.87	34.25	34.75	.....	.....	.....
Cleveland	32.50	33.00	33.50	.....	.....	Jersey City	Bethlehem	1.84	35.84	36.34	36.84	37.34	.....
Duluth	33.00	33.50	34.00	34.50	.....	Jersey City	Birdsboro	2.33	.....	.....	.....	.....	47.33
Erie	32.50	33.00	33.50	34.00	.....	Los Angeles	Provo	5.94	38.94	39.44	.....	.....	.....
Everett	.....	45.00	45.50	.....	.....	Mansfield	Cleveland-Toledo	2.33	34.83	35.33	35.83	36.33	.....
Granite City	32.50	33.50	33.50	.....	.....	Philadelphia	Bethlehem	1.67	35.67	.....	.....	.....	.....
Neville Island	33.00	33.50	33.50	34.00	.....	Philadelphia	Swedeland	1.01	36.01	36.51	37.01	37.51	.....
Provo	33.00	33.50	.....	.....	.....	Philadelphia	Steelton	2.15	.....	.....	.....	.....	41.15
Sharpsville	33.00	33.50	33.50	34.00	.....	San Francisco	Provo	5.94	38.94	39.44	.....	.....	.....
Steelton	34.00	.....	.....	.....	39.00	Seattle	Provo	5.94	38.94	39.44	.....	.....	.....
Struthers, Ohio	33.50	.....	.....	.....	.....	St. Louis	Granite City	0.75 Arb.	33.25	34.25	34.25	.....	.....
Swedeland	35.00	35.50	36.00	36.50	.....								
Toledo	32.50	33.00	33.50	34.00	.....								
Troy, N. Y.	34.00	34.50	35.00	35.50	39.00								
Youngstown	33.00	33.50	33.50	34.00	.....								

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$42.50; f.o.b. Buffalo—$43.75. Add $1.00 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorous $43.00 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $48.49. High phosphorous charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	157.00
Delivered Pittsburgh	140.25

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	7.00	7.25	7.80
Ton lots	8.00	8.60	10.50
Less ton lots	8.40	9.00	10.90

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$43.00	$44.00
F.o.b. Pittsburgh	47.00	48.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.06% max. C, 0.06% P, 90% Mn	21.00	22.10	22.70
0.10% max. C	20.50	21.60	22.20
0.15% max. C	20.00	21.10	21.70
0.30% max. C	19.50	20.60	21.20
0.50% max. C	19.00	20.10	20.70
0.75% max. C, 7.00% max. Si	16.00	17.10	17.70

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.65
Ton lots	7.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.75
Ton lots	7.75
Less ton lots	8.15

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $64.00 f.o.b. Keokuk, Iowa; $65.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add 50¢ per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	16.50	17.85	19.60
97% Si, 1% Fe	16.00	18.25	20.00

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	4.25	4.50	4.70
Ton lots	5.25	5.85	6.15
Less ton lots	5.65	6.25	6.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	11.65	....	....
50% Si	7.80	8.30	8.50
75% Si	10.00	10.30	11.05
80-90% Si	11.30	11.60	12.35
90-95% Si	12.80	13.10	13.80

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.75	22.15	22.25
0.50% C	21.50	21.90	22.00
1.00% C	21.00	21.40	21.50
2.00% C	20.50	20.90	21.00
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr. 4-6% C. 6-9% Si.	16.60	17.00	17.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump sie, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	21.00	21.40	21.50
Ton lots	22.35	23.00	24.20
Less ton lots	23.35	24.00	25.20

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	14.00	14.50	16.55
Ton lots	16.10	16.85	19.00
Less ton lots	17.10	17.85	20.00

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	17.60	18.45	20.20
Less ton lots	18.60	19.45	21.20

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.60	$2.35	$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	16.00	17.10	19.05
Less ton lots	16.75	17.85	19.80

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	14.25	15.35	17.30
Less ton lots	15.00	16.10	18.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa. York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.25
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b Langeloth, Washington, Pa., Per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y. ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton	$65.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	17.00¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	5.50¢
Alsifer, 20% Al, 40% Si, 40% Ft, contract basis, f.o.b. Niagara Falls, carload	6.25¢
Ton lots	6.75¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.00¢
Ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17-50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese — Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	35¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0% Al 1.0—2.0%.

Ton lots, per pound	8.0¢

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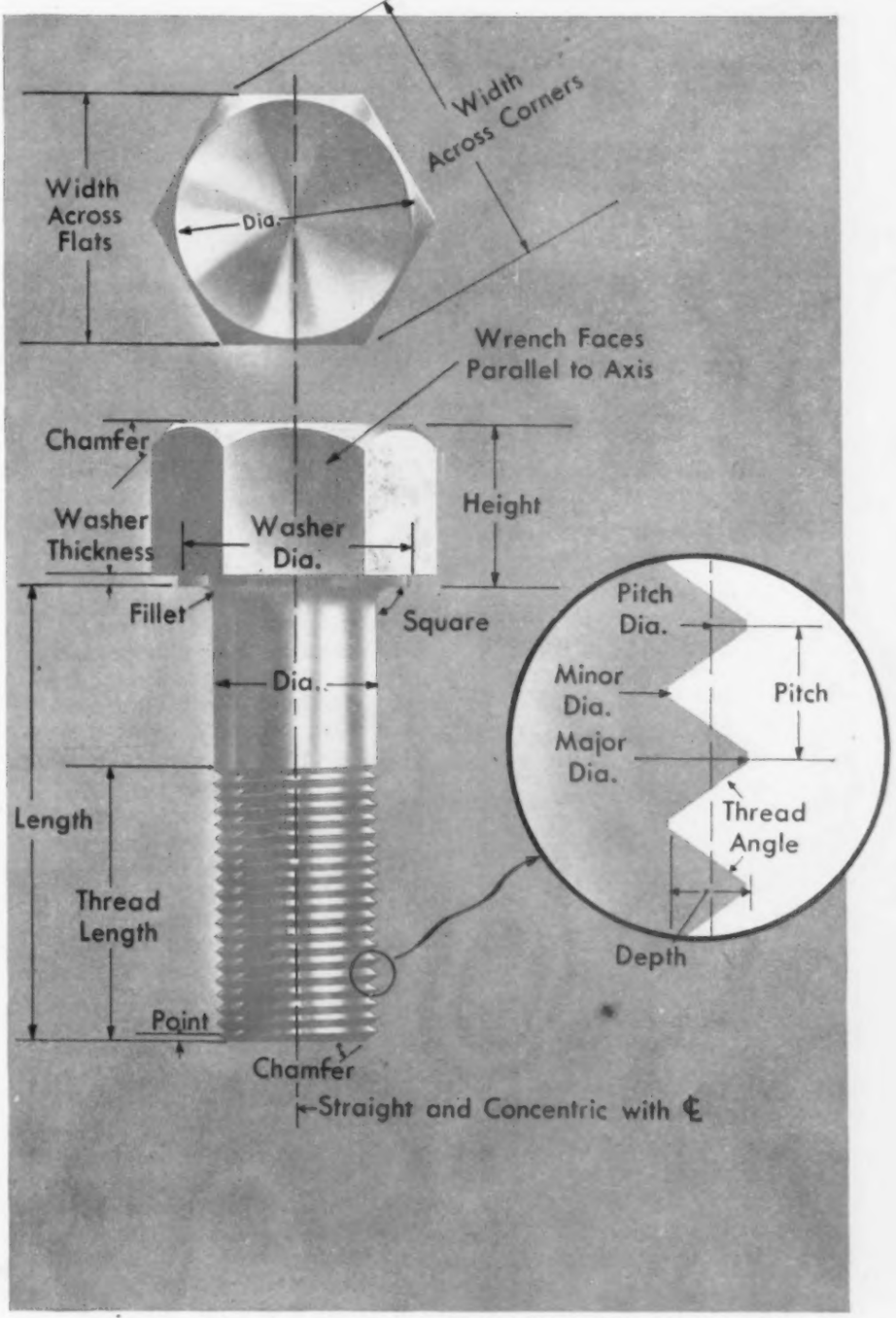

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Two Out of Five Firms Report Manhour Output Better Than A Year Ago

New York

• • • **Executives in two out** of every five companies report that production per employee is greater now than a year ago according to the latest monthly survey on personnel problems conducted by the National Industrial Conference Board. A similar number declare that production is about the same as it was a year ago and one in ten asserts that employee output is either less than a year ago or "better in some departments and poorer in others."

Of the companies reporting an increase, most hesitated to express the improvement in terms of definite figures. Where percentages were furnished, the figures range from 8.5 pct to 30.0 pct. Several of the executives whose employees are producing no more than a year ago say that "quality has improved noticeably."

Compared with prewar experience, the record is reported as not nearly so favorable. Production per employee is less now in approximately 40 pct of the cooperating companies and greater than prewar in only one out of four cases. In about 25 pct of the companies, executives estimate that production is about the same as before the war.

A variety of reasons for the increases in production were cited. The two most frequently mentioned were the increased skill of workers resulting from intensive training and improved methods. Also frequently mentioned in connection with employee skills are the beneficial results that have come about through the return of experienced workers from the armed services.

Approximately 40 pct of the cooperators give some credit to improved wage incentive plans and about the same number mention the contribution made by new equipment and tools. A significant number stressed the importance of the higher caliber of supervision achieved through supervisory and foreman development programs.

Unions and their "willingness to cooperate" are given credit in several cases. The great majority of the companies that appear most

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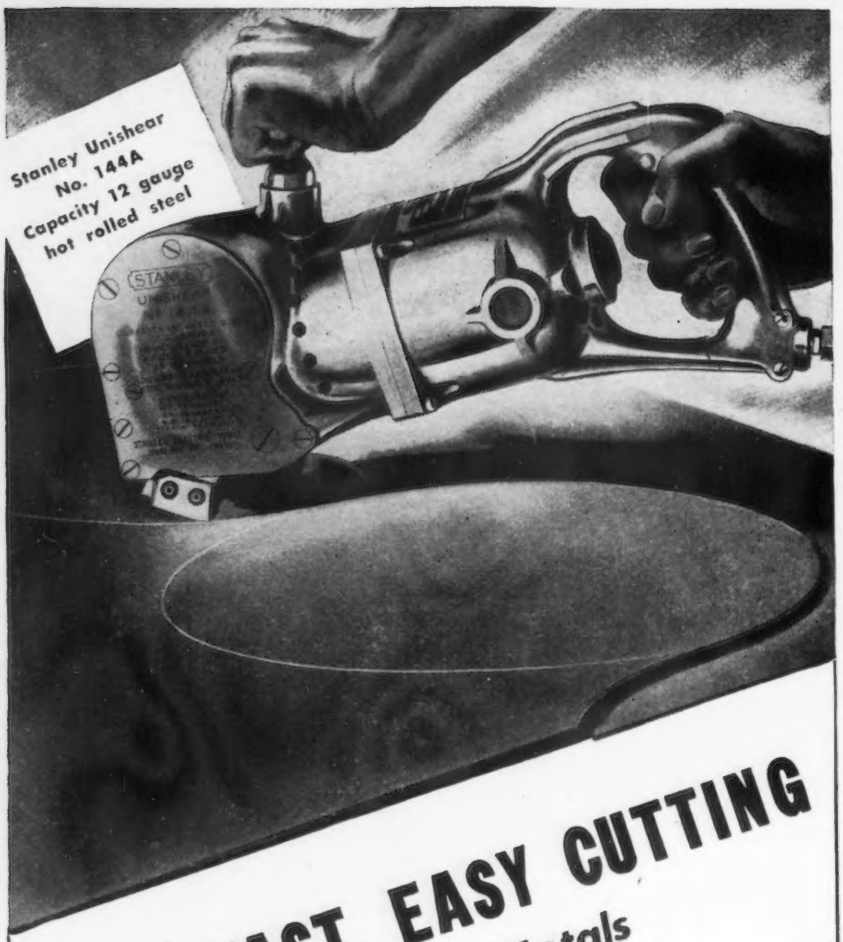

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satisfied with their production figures emphasize "a noticeable change for the better in employee attitudes."

In this latter group are companies that have made a concerted effort to improve their channels of communication with employees in the ranks. Executives report that this has been attained not only by bringing pertinent information to the worker via bulletin boards, house organs, special letters and group meetings, but also, as implied above, by increasing the amount of information at the disposal of the supervisor to be passed along informally as well as formally to subordinates.

In two companies, top executives are intensively searching for methods of making each worker's job more interesting with special effort being expended upon highly repetitive and monotonous operations.

Efforts among the cooperators to increase production in the immediate future involve all of the techniques previously mentioned. There is, however, a noticeable difference in emphasis. Plans for the future reveal widespread recognition of the potential contribution to production problems of informed, well-trained, properly placed and satisfied employees. Responsibility for achieving these appears to be assigned about equally to supervisors and executives in the line organization and to those who are normally charged with the staff functions of personnel administration.

Buys Metal Casting Plant

Washington

• • • **General Alloys Co.** has purchased from WAA the Boston metal casting facilities it operated for the government during the war. The firm paid $38,000 for the buildings, machinery and other property closely integrated with the buyer's property.

At the same time, WAA announced that Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., is acquiring government owned facilities which were integrated with the company's own plant during the war for increased production of gray iron and steel castings. A price of $696,666.67 was agreed upon.

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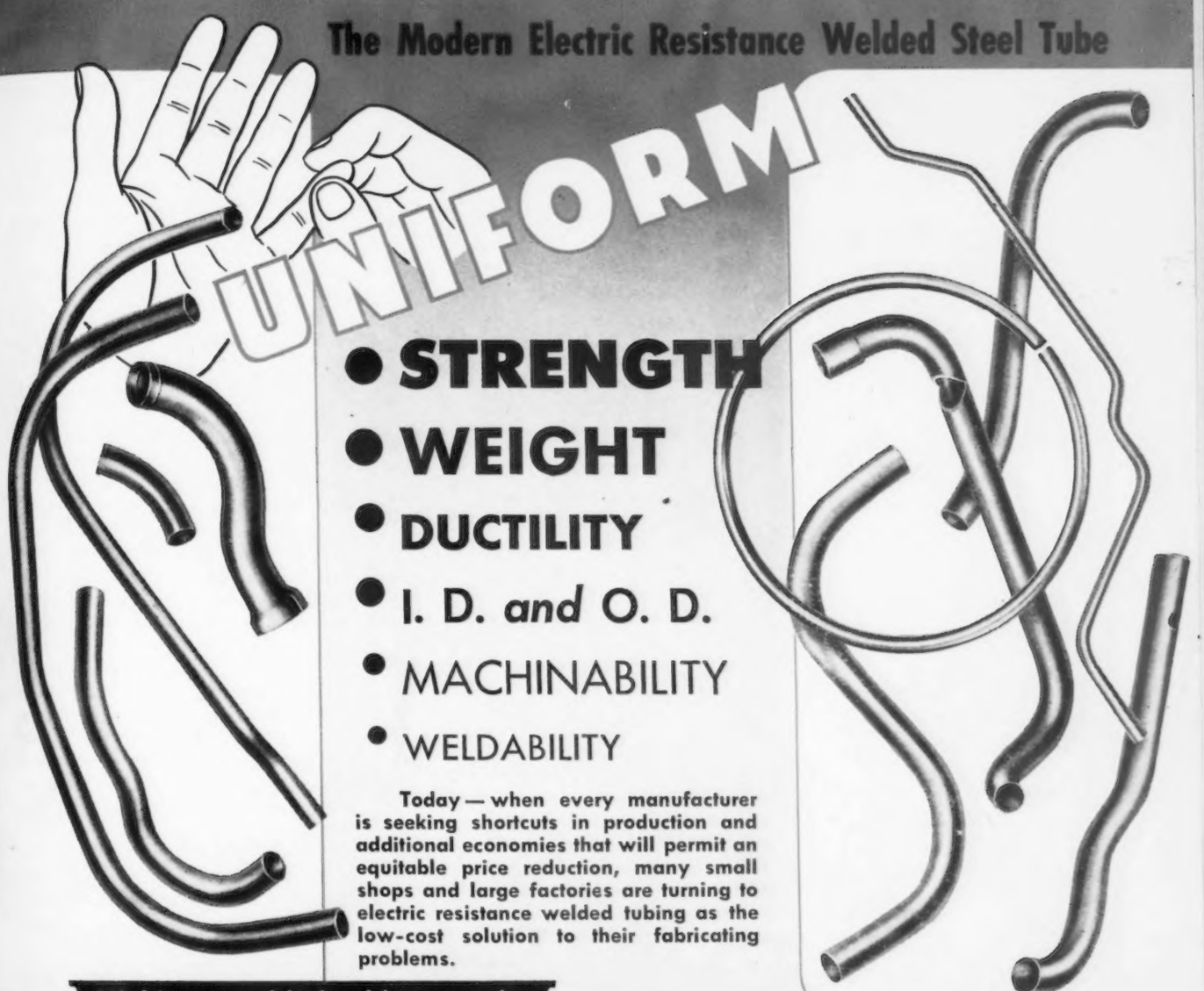

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SHEAR BLADES
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Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.

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Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.

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Shear Blade Specialists Since 1891
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Commerce Dept. Sees Supply Nearing Demand For Building Materials

Washington

• • • **Although current** output of a few materials, including sheet metal products, are inadequate in some areas, there is indication of an increasing trend toward the balancing of supply and demand for most building materials, according to the Commerce Dept. June report on construction and construction materials.

April production of the 19 materials included in the department's composite index was almost seven points over March and 17.5 points over a year ago. In only one item —mechanical stokers — was April output below April 1946.

In most instances, the remaining 18 items were made in twice the quantity as in 1946 while cast iron soil pipe, cast iron radiation and water heaters exceeded three times the output for the same month last year.

May production of steel ingots and steel for castings amounted to 7.3 million tons, 4 pct increase over the April output, the Department said. At the same time, bookings of 143,100 tons of fabricated structural steel in April represented a 5 pct decrease over the March bookings of 143,600 tons. Shipments of 139,000 tons, however, were 12 pct more than the 1939-40 average.

April production of wire nails and staples registered a slight increase above the 77,000 tons figure for March, a level somewhat above the average for the first quarter. However, it was expected that this might gradually drop back to nearer 70,000 tons a month, due to the dropping of the premium payment incentive as of Mar. 31.

Other building material production and trends were:

Cast iron pressure pipe: April shipments of 82,000 tons were 7 pct below March but well above any month in 1946. Unfilled orders rose slightly to more than double those of a year ago.

Cast iron radiation: April output dropped to 4.8 million sq ft, slightly below the March production.

Builders hardware: April output remained constant during the quarter while the supply of butts, hinges, and heavy hardware shows

an easing of demand. Distributor inventories, however, were reported as continuing at low levels.

Steel windows: Production of light steel casement is increasing while indications were that all types of metal windows will soon be in good supply.

Insect screen cloth: Although production of both steel and bronze types continues to increase to a point far in excess of a year ago, shortages are expected to continue throughout 1947 because of a continuing increase in demand.

Induction, Dielectric Manufacturers Form A New Product Group

New York

• • • **A new electrical** product group, comprising eleven companies, nationally recognized in the expanding industry that manufactures apparatus for induction and dielectric heating, has been announced by the National Electrical Manufacturers Ass'n.

Chairman of the group, known as the Induction and Dielectric Heating Apparatus Section, is Dr. H. B. Osborn, Jr., sales manager, Tocco Div., The Ohio Crankshaft Co., Cleveland. C. W. Miller, sales manager, Industrial Electronics Div., Westinghouse Electric Corp., Baltimore, Md., is vice-chairman.

"The section was formed," Dr. Osborn points out, "to insure greater benefits to the user of high-frequency heating equipment, as well as the manufacturer. These, we feel, can best be achieved through a pooling of ideas. The section, for example, will set up equipment standards and ratings, and safety requirements, and many other factors also pointing the way to greater efficiency, increased production, lower costs, faster deliveries and improved service."

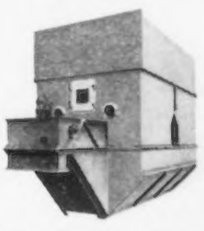
The section is defined as encompassing "induction and/or dielectric heating apparatus together with accessories, excluding renewal parts and physio-therapeutic apparatus—also excluded are motor generator sets and generators except when sold as parts of any complete induction and dielectric heating installation."

To best handle all technical aspects for the section, a general engineering committee has been

Eats DUST and FUMES from YOUR production

Schmieg CENTRI MERGE DUST and FUME Eliminator

AUTOMATICALLY
- COLLECTS —at point of origination.
- CLEANS —by high pressure water action.
- DISPOSES —by mechanical conveyor in the form of sludge.



Like a huge octopus, with its tentacles (ducts) reaching out to every working area where contamination of air occurs, the Schmieg CENTRI-MERGE Eliminator sucks up and consumes all dangerous dust and fumes—literally eats them up.

Picked up at the point of origination—BEFORE *any damage can be done*—dust and fumes ride an air stream through the ducts to the Collection Unit. Here CENTRI-MERGE goes into action—washing—scrubbing—pounding out the dust and dirt in a tornado of cleansing water. Dust particles are deposited—under water—in a sludge tank at base of Unit.

Right now — today — CENTRI-MERGE Eliminators are removing the hazard of dust and fumes from scores of plants—doing a more thorough job than any other method—and doing it more economically. We welcome the opportunity of proving what CENTRI-MERGE can do for you.

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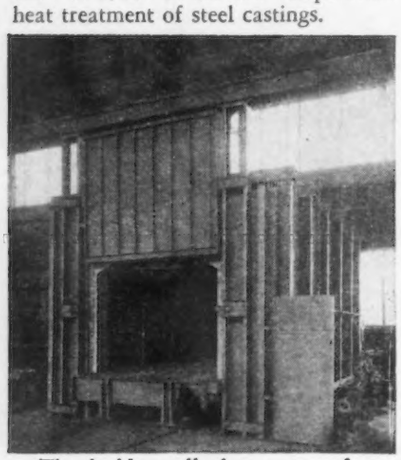
R-S Furnace Facts

FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

They Bought the Best ... not the Cheapest!

Picture shows an oil-fired forced convection type of car-hearth furnace built in 1942 for the American Steel Castings Company of Newark, New Jersey.

The heating chamber handles a charge of 22 tons per heat. Two circulating fans supply 25000 CFM each of air at 600° to 1300° F. for low temperature heat treatment of steel castings.



The inside wall shows one of two alloy ducts which distribute hot air horizontally across the charge from both sides. The return duct in the top of the chamber returns the air to the heater to be restored to temperature.

The vertical white lines on the duct are the connecting joints; the horizontal white lines the thermocouples. A burner safety control prevents operation of burners unless fans are running. Car drive and door-lift operate electrically.

Said a happy steel man in Australia
Who had won a first prize with a dahlia
"It's such a success
I'll name it R-S;
That's another that never will fail ya!"

R-S Furnaces will never fail to keep quality and production at the highest levels. Quite as important: They keep maintenance DOWN. Don't look now, but if your Maintenance is showing, give a serious thought to R-S Furnaces for your next unit. JMLCoPG-1

Typical ingenuities of R-S design are the counterweights, carried to the side rather than hung over the arch where the possibility of chain breakage would invite damage to brick-work. The guard prevents accidents to workers, but is high enough to discourage use as a waste-basket.

FURNACE DIVISION
R-S Products Corp.
PHILADELPHIA 44, PA.

established—composed of technical personnel in the high frequency heating field. The chairman is T. P. Kinn, manager, Industrial Electronics Engineering, Westinghouse, Baltimore.

Also formed was a federal communications commission committee, the chief purpose of which is to keep in touch with the FCC on matters of mutual interest. Because of their close association with this phase of activity in the past, K. E. Kjolseth, manager of sales, induction and dielectric section, Industrial Heating Div., General Electric Co., Schenectady, N. Y., and J. W. Cable, director of research and development, Induction Heating Corp., New York, have been appointed respectively, chairman and vice-chairman.

Another part of the section includes the statistical committee, under the chairmanship of Otto Weitmann, vice-president of the Lepel High Frequency Laboratories, Inc., New York, N. Y.

Other companies and their representatives affiliated with the section are: Allis-Chalmers Mfg. Co., Milwaukee, C. R. Dernbach, sales engineer; Cutler-Hammer, Inc., Milwaukee, F. A. Wright, assistant general sales manager; Federal Telephone & Radio Corp., Clifton, N. J., George Lewis, assistant vice-president; The Girdler Corp., Louisville, Ky., Boyd R. Hopkins, sales manager, Thermex Div.; RCA Victor Div. of Radio Corp. of America, Camden, N. J., William G. Ellis, manager, industrial electronics section, engineering products department; and Weltronic Co., Detroit, C. J. Collom, general manager.

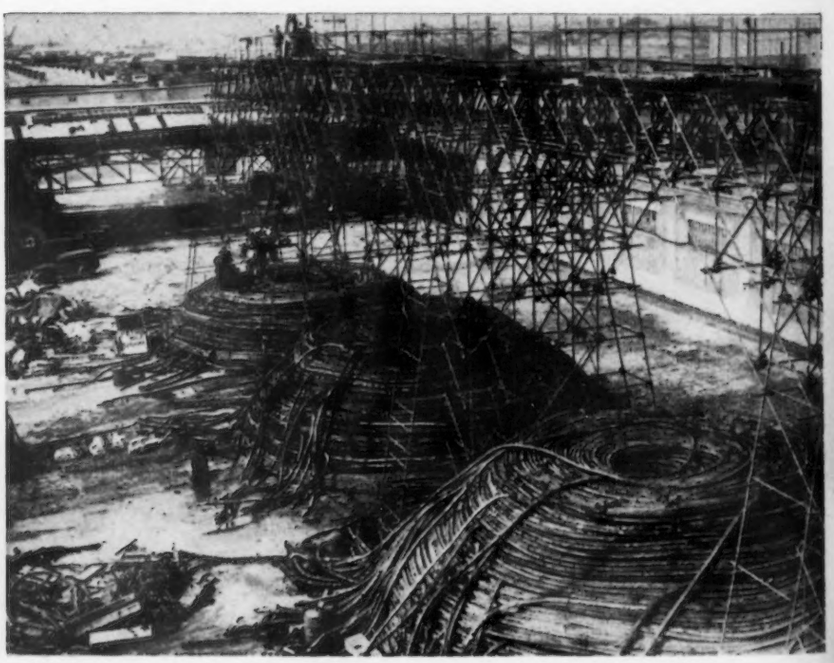
German Trade Fair Planned in Hanover

London

• • • **An announcement** issued by the British Foreign Office (German section) states that the first export trade fair for the display of goods produced in the joint U.S./U.K. zones of occupation in Germany will be staged in the Vereinigte Leichmetall Werke factory at Laatzen, 3 miles from the centre of Hanover, August 18 to September 7. It will be housed in four buildings with a total covered area of approximately 20,000 sq. yds.

The products displayed are expected to be available for export immediately or within a reasonable time. They will include electrical machinery and equipment and electrical domestic appliances; light metal products and hardware; agricultural, building, printing and general machinery; fine mechanical and optical instruments and equipment.

PLUTO COMING UP:—*More than 100 miles of the undersea pipeline which fed gasoline to the supply lines in the European campaigns have been salvaged. These three coils on the Southampton docks contain over 75 miles of the precious lead-bearing tubes.*



MAKE 1947 PRODUCTS ON 1947 PRESSES

Radio panels, hubcaps, headlight frames, chrome stripping—gleaming automotive hardware—put the finishing touch on the new 1947 models.

With product design changing from year to year, and vast quantities of ornamental parts required, manufacturers are called upon for maximum output on the production line. Danly Presses step up production efficiency to meet this ever increasing demand, because they insure faster runs, more accurate stampings, minimum "down-time" and lower costs.

Whether it be blanking, forming, embossing, piercing, drawing or any similar operation, modern Danly Presses have the versatility, rugged construction and mechanical accuracy for quantity production at lower unit cost.

MAKE 1947 PRODUCTS ON 1947 PRESSES

This 100-ton single point model is one of a number of Danly Presses built in sizes ranging from 100 tons up. Special sizes and adaptations engineered to customer specifications.

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MACHINE MANUFACTURING COMPANY
PITTSBURGH, 23, PA.

15

Development of New American Standard Announced by ASA

New York

• • • **A new American** Standard to be used by those dealing with one of the major problems in the mechanical and related mass production industries has been developed by a technical committee of the American Standards Assn., P. G. Agnew, vice-president of the organization, announced.

The new standard, entitled Limits and Fits for Engineering and Manufacturing (B4.1-1947), is a partial revision of the Tentative American Standard on Tolerances, Allowances and Gages for Metal Fits approved in 1925.

Its purpose is to serve as a guide to the machine designer in keeping to a minimum the various tools and gages required to produce and inspect cylindrical holes and shafts or other component parts with cylindrical external surfaces.

Without such a guide, excessive variety in hole and shaft sizes may easily grow up. One large American concern carried on its drawings about eight hundred holes in sizes of 1 in. and below.

In the new American Standard, a table of preferred basic sizes covers the range up to 4 in., inclusive, by as few as 46 diam for holes and shafts, Dr. Agnew said. The inclusion of a table of this kind in a standard referring to fits between cylindrical parts is made for the first time.

The new standard recommends the use of a series of preferred tolerances and allowances, to keep down the variety of limiting dimensions of component parts and, hence, the cost of manufacturing.

Most industries use the "basic hole" system in which the minimum limit of all holes of a given nominal size is kept constant and the maximum limit of the shaft is varied in accordance with the character of the required fit. The standard of 1925 was based exclusively on this system.

The new standard, however, also recognizes the "basic shaft" system which is used widely, for example, in the textile machinery industry. Here, the maximum limit of all shafts of a given nomi-

nal size is kept constant and the minimum limit of the hole is varied so as to get the required fit.

A series of definitions of terms applicable to a system of limits and fits are given in the new standard. These definitions have been agreed on by representatives of the American, British and Canadian national standards bodies, Dr. Agnew said.

The new standard is intended primarily for application to fits between cylindrical parts, but may be used also for fits between parts of a different kind, such as a shafting key and the keyway in which it is to be inserted.

WAA Administrator Asks End of Surplus Property Priorities

Washington

• • • **WAA Administrator** Robert M. Littlejohn has recommended that priorities on surplus property, except in the case of federal agencies buying for their own use, be brought to an end in order to speed liquidation of his agency.

"All reasonable priority requirements for personal property can and should be taken care of by Dec. 31," he declared, "and WAA should then enter a liquidation cycle."

Replying to congressional and other criticism of his agency, Mr. Littlejohn warned that if recommendations of the House Surplus Property Subcommittee is followed and the present priority procedure retained indefinitely, "billions in surpluses will be relegated to a political junkyard."

He pointed out that to date some $18 billion (original cost) in surpluses has been disposed of to veterans, industry, and government and municipal organizations; from this gigantic selling campaign the government has received more than $3.5 billion or a recovery rate of about 34¢ on the dollar. Administrative costs are about 6¢ per dollar received.

At the same time, WAA released its report for May which revealed sales of $784 million; this holds the average for the first 5 months of 1947 to above the $1 billion a month mark.

A breakdown for May showed that real property disposals continued to lead all other types with

WHY CARRY WHEN YOU CAN CONVEY

Carrying is the oldest form of material handling—modern production demands faster, cheaper and more efficient material handling — conveyors.

Investigate the use of conveyors. Conveyors handle a wide variety of parts, packages, units, cans, bottles, barrels, bundles, drums and boxes. Available in light, medium or heavy-duty types — portable or stationary — as systems, sections or units — power or gravity fed, they give you remarkable savings in time, money and manpower conservation. They relieve confusion and congestion.

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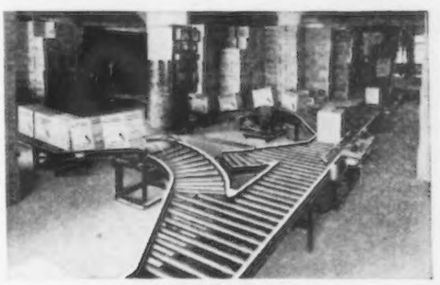
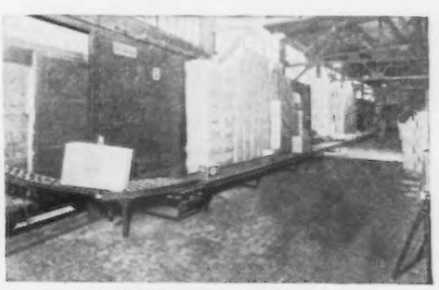
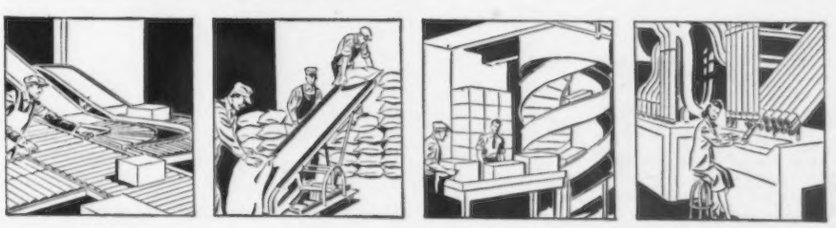
No congestion — order and cleanliness when production moves on conveyors.



WAREHOUSES
Merchandise flows in and out of storage with order and system on conveyors.



LOADING DOCKS
Load or unload shipments in half the time with conveyors.



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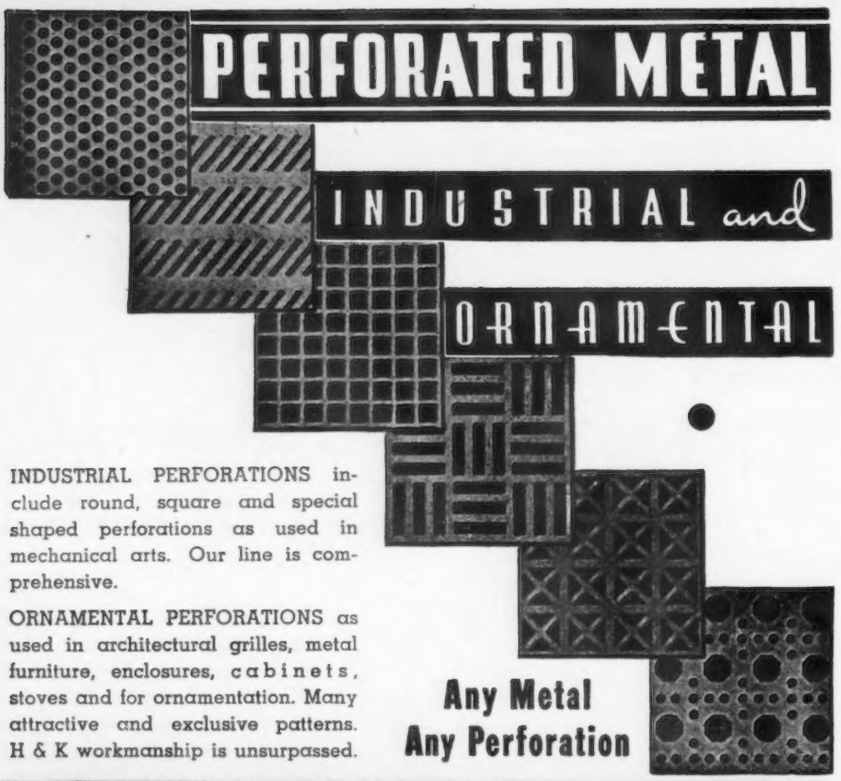

INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns. H & K workmanship is unsurpassed.

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Wherever **WIRE ROPE** *is used for Tough Jobs . . .* **THERE** *is the Proving Ground for*

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(Red Strand)

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There is a type and construction to fit every wire rope requirement, whether Round Strand or Flattened Strand—Preformed or Non-preformed.

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$302 million; consumer and producer goods accounted for an additional $292 million. Significantly, the rate of return for May was down to 18¢ on the dollar, indicating a lowered demand.

Steel Production In Austria Shows General Increase

London

• • • **Output figures** for the Alpine-Montan concerns in Austria for the month of April show a steep rise since the relighting of the Donawitz blast furnace on Mar. 30. Not only was last year's level for April reached, but in most cases it was surpassed, while in the steelworks at Judenburg the figures were the highest since the end of the war. A considerable factor was that coal production for the first time rose above the highest monthly figure of 1937.

Details showing a comparison between output for last year and this are appended. All figures are in tons.

Works	Products	January 1946	April 1947
Donawitz	Pig iron	0	28,400
	Steel	22,310	54,600
	Rolled Metal	20,100	44,300
Judenburg	Steel	1,400	2,700
	Rolled Metal	1,500	2,100
	Other items	700	1,500
Zeltweg	All items	1,500	2,500
Eisenerz	Iron ore	52,200	131,000
Huettenberg	Iron ore	9,700	32,400

Electroplaters Elect

Detroit

• • • **Kenneth M. Huston** was elected president of the American Electroplaters' Society at the annual meeting held here last month. Mr. Huston, who is with Rustless Iron & Steel Div., American Rolling Mill Co., Baltimore, served the society as its first vice-president in 1946-47.

Other officers elected at the meeting include: S. S. Johnston, Weirton Steel Co., Weirton, W. Va., first vice-president; A. W. Logozzo, Nutmeg Chrome Corp., Hartford, second vice-president, and William Neal, Columbus Metal Products Co., Columbus, Ohio, third vice-president. Dr. A. K. Graham, Graham, Crowley & Associates, Jenkintown, Pa., was re-elected executive secretary.

McKee Reports High Level of Contract Work in Two Years

Cleveland

• • • **New plant construction,** rehabilitation and modernization of existing plant facilities have continued at a high rate in the iron, steel and petroleum refining industries in this country since the start of 1947, according to Arthur G. McKee & Co.

In a quarterly report to shareholders, Arthur G. McKee & Co. revealed that its dollar volume of new contract work for 1947 to date, as measured by the estimated completion cost of plants to be designed and built by the company, is approximately the same as for the corresponding period in 1946.

New work in 1947 includes foreign petroleum refining plant installations, several domestic petroleum refining plants, and a blast furnace in the Chicago district.

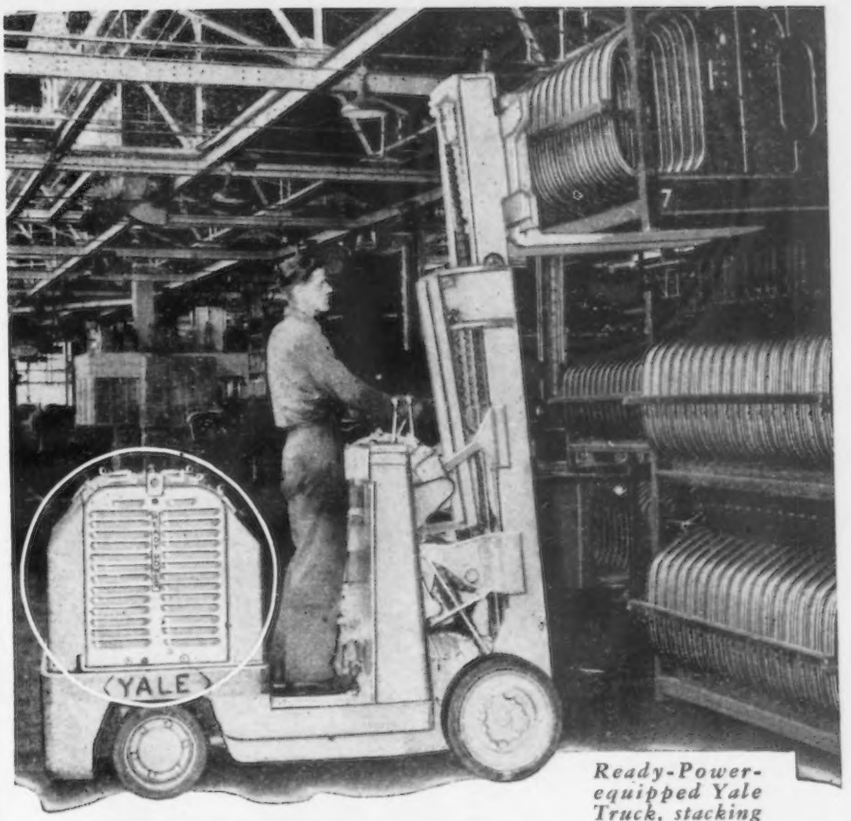
This construction program, the report pointed out, is partly due to the necessity of rebuilding and replacing operating units which were worn out during the war, and also due to obsolescence.

Emphasis during the war, particularly in the case of refining facilities, was placed on equipment to make products to meet the needs of the war; at the end of the war it became necessary for the refiners to provide equipment for meeting commercial requirements.

Although there are signs that there may shortly be a leveling off in the present high rate of iron and steel plant and petroleum refining construction, Arthur G. McKee & Co. anticipates a substantial volume of new domestic work during the remainder of 1947.

The report pointed out that England is embarking on a major iron and steel plant rehabilitation and modernization program and in the European countries ravaged by the war, many petroleum refineries were damaged beyond repair. These refineries will have to be rebuilt and considerable new refining capacity is needed in these countries for future needs.

Unfavorable factors with respect to prospective foreign business are the rapidly diminishing U. S. dollar resources of some for-



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power unlimited WITH READY-POWER

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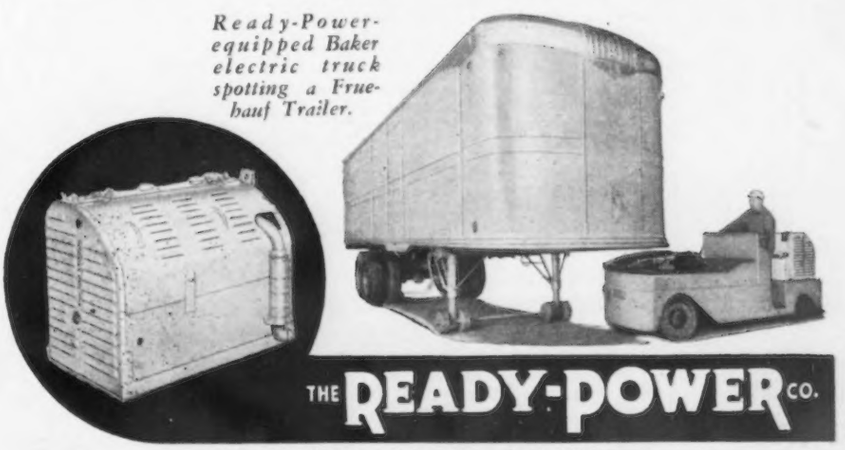

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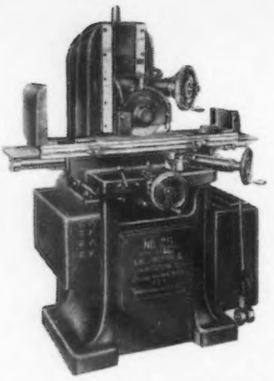

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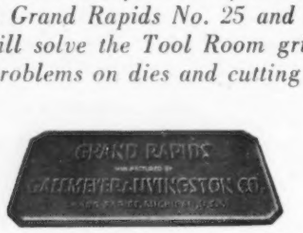

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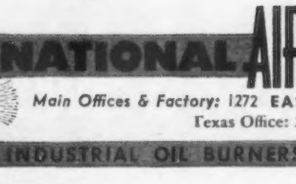

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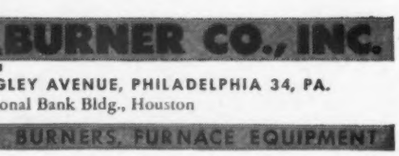

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INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT

eign countries and the unstable political conditions of others, according to the report.

According to the report, slow deliveries of materials continue to hamper the progress of the company's work and the supply of skilled labor remains inadequate for field construction.

Staggered Hours To Be Rule in Britain In Coming Winter

London

• • • **The engineering** employers and the trade unions in England have reached an agreement on a national plan for the staggering of hours of work during the coming winter. The coal stock position is reasonably satisfactory for this time of the year but a lot more fuel will have to be put down in the stock piles for the winter. The 5-day week in the mines is not bringing the desired results and everyone with memories of the chaos last February and March is seeking all possible safeguards against similar happenings late this year or early next.

There is a growing conviction that only by a spread-over of work during the 24 hours will it be possible to get through. Apart from coal supplies, power generating machinery is insufficient to carry the full load which is expected during the winter months when demands for the heating of homes and lighting are added to industrial calls for current.

Problems arising in connection with the staggering of hours include the reluctance of workers to accept night-shift jobs and questions of overtime payment. Men operating outside the usual working hours can claim extra payment under most of the industrial agreements current today. Employers are not too anxious to add to their costs if hours staggering is forced upon them through no fault of their own.

It is also possible that of two firms engaged in the same line of business in the same area, one would be carrying on normal work and the other would be forced into night operations involving extra wage costs compared with his competitor.

The engineers appear to have solved most of the difficulties.

Working hours will be determined locally in the light of power supply conditions but the broad principles to be followed and the terms and conditions of shift working have been laid down nationally. Night shifts will be paid as under the existing national agreements. Hours worked between 7 a.m. and 8 p.m. on day shifts will be treated as normal hours and paid accordingly. Hours worked beyond these times will be paid overtime.

Saturday morning working is outside the 5-day week arrangement but where Saturday working is necessary, payment for hours between 7 a.m. and 12.30 p.m. will be at normal time rates. It is hoped that factories will be grouped locally on an area basis so that the full industrial load does not occur during the dangerous peak periods.

Metal Firms Lead In Pittsburgh Employment

Pittsburgh

• • • **In an employment** survey conducted by the Pennsylvania State Employment Service for the Pittsburgh labor market area, it was shown that industrial activities employed 451,125 of the total employment in the area of 682,075. The metalworking phases of industry employed the largest part of this total, with 257,900 employed. Nonmetal working but still under manufacturing category employed 71,900. So-called white collar activities employed 175,250.

Employment by manufacturing industries continued firm during the April-May period, although decreases have been noted in the machinery and transportation equipment manufacturing industries. The latter is partly caused by the layoff of railroad car builders. This layoff, the carbuilders reported, was caused by steel shortages. More widespread, PSES reported that employment is being affected by material shortages and delays in shipments of supplies.

Some concern was expressed by the PSES in the placing of 7500 high school graduates plus thousands more from private schools, colleges, and universities. Many are veterans who are applying for

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Servicemen's Readjustment Allowances. Currently, more than 12,800 veterans including more than 5000 under 25 years of age, are collecting the SRA benefits.

Domestic Exports For Canada Advance to New Postwar High in May

Ottawa

• • • **Showing a sharp** advance of nearly $77 million over April, Canada's domestic exports reached a new postwar high level for any May when they were valued at $267,800,000, the Dominion Bureau of Statistics reports.

The May figure compares with $197 million for May last year and $295 million for August 1945 the last wartime month. This high figure for May brought the aggregate for the year to $1,055,800,000 compared to $896,100,000 for the same period last year.

Exports to the United Kingdom in May rose to $90,481,000 compared with $54,902,000 last year and $43,070,000 in April, the aggregate for the first five months being $276,444,000 as against $235,459,000 in 1946.

Aggregate shipments to other British Empire countries also increased in May to $41,700,000 compared with $29,900,000 last year. Major increases were in exports to New Zealand at $4,917,000 compared with $1,052,000 and Australia at $5,231,000 compared with $3,183,000. Value of shipments to the Union of South Africa and India showed decreases.

May shipments to the United States continued the upward trend of previous months, totaling $79,769,000 as against $72,200,000 in the same month of 1946, and brought the aggregate for the year to $400,007,000 compared with $329,950,000 last year.

Exports to Latin America also increased, from $6,828,000 to $10,178,000 the principal gain being to Argentina with $2,011,000 in May compared with $766,000 last year. Brazil and Colombia figures also increased considerably, bringing the aggregate to Latin America for the year to $55,055,000 as against $35,939,000 in the 1946 period.

Shipments to European countries jumped to $37,903,000 from $25,645,000 last year.

Weekly Gallup Polls

(CONTINUED FROM PAGE 103)

ting debt in preference to cutting taxes.

While nobody likes to pay high taxes, it is significant that the President's veto of tax reduction this year did not arouse any very impressive outcry of protest from the voting population. Congress is reconsidering the tax bill, but if it is passed the tax reduction would not take effect until the first of next year.

•

• • • **After a period** of initial decline, Prime Minister Attlee's popularity in England seems to have stabilized.

The Labor Government took office 2 years ago this month. Mr. Attlee's popularity at the beginning of his administration was measured by the British Institute of Public Opinion which found, in August 1945, that 66 pct of the voters polled approved of Mr. Attlee's handling of his job.

This high figure began to come down as Britain's postwar food and financial crises deepened and as the government's program for nationalization of industry unfolded itself. By October 1946 the Prime Minister's popularity was down to 53 pct. It has continued virtually unchanged since that time.

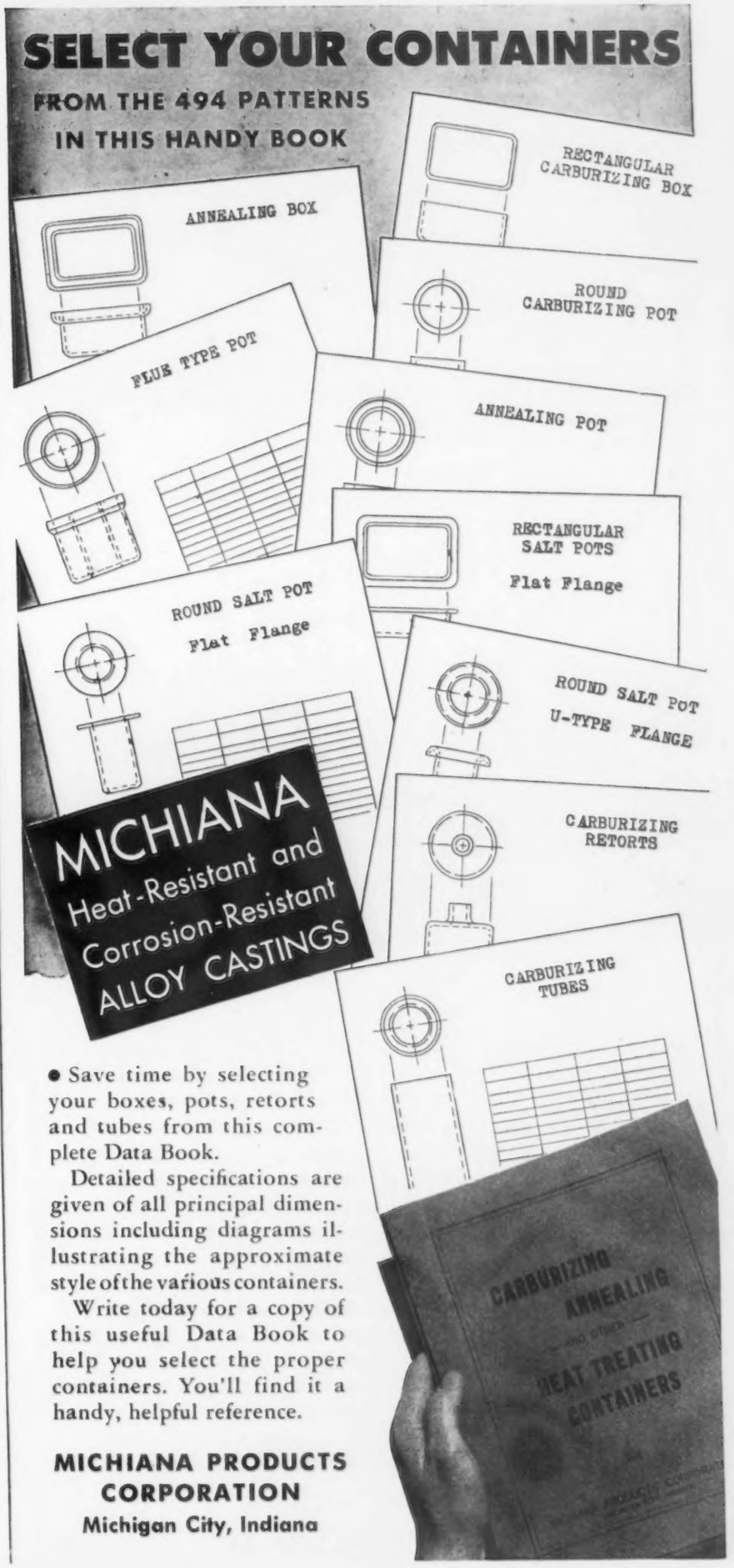
Following is the trend as shown in surveys by the British institute, which is affiliated with the American Institute of Public Opinion:

"On the whole, do you approve or disapprove of Mr. Attlee as Prime Minister?"

	Approve Pct	Disapprove Pct	No opin. Pct
Aug. 1945	66	19	15
Oct. 1946	53	35	12
Feb. 1947	52	30	18
TODAY	51	36	13

It will be noted that while the number expressing approval has shown little change in recent months, the proportion expressing disapproval has increased since February, most of the increase having come from the group previously "on the fence" and expressing no opinion about the Prime Minister.

In spite of the decline, Mr.



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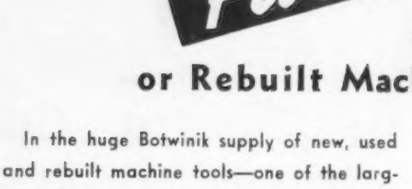

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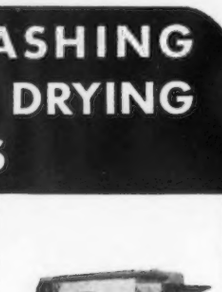

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Attlee is more popular than his party.

A recent British institute survey found that the opposition party—the Conservative party—has gained ground to the extent that it now runs neck-and-neck with the Labor party, although it was decisively beaten by the latter only 2 years ago.

The trend of basic party strength, irrespective of the personalities of political leaders, is shown in the following vote:

"If an election were held today how would you vote?"

	Labor Party Pct	Cons. Party Pct	Liberal & Other Pct
Election 1945	49	39	12
May 1946	45	39	16
Jan. 1947	44	41	15
May 1947	44	44	12

The May figures are based on the total expressing an opinion. One person in every eight (13 pct) had no opinion.

Metal Distribution From a Plating Bath

(CONTINUED FROM PAGE 59)

density the plating rate may be calculated, providing the cathode efficiency is known or measured at that current density. In practice this is not often done, but if it is applied in reverse, a knowledge may be gained of approximate metal distribution.

Suppose plating is to be done on a complicated shape with an acid nickel bath; and further assume that the cathode efficiency is known at all current densities over the plating range. Now the piece may be plated at some total current for a definite time. If the thickness is measured in any area, then the current density in that area may be calculated from the metal plating rate. The average current density for the entire piece can be calculated from the total area and the total current. If the local current density is low compared to the average current density, then a metal distribution problem is indicated. The metal plating rate is then high in some other area of the piece. By rearrangement of the anodes, shadowing or robbing, a more favorable distribution may be obtained.

"Vanishing Ore Reserves" Theory Scouted Before Civil Engineer Meeting

Duluth

• • • **The spectre of** war-depletion of Minnesota's famed Mesabi iron ore through annual shipments which averaged 63,167,000 tons for the 5 years ending with 1945 was again dispelled at the summer convention of the American Society of Civil Engineers here on July 16.

"A long future is ahead of the mining industry in this state," it was predicted by Elting H. Comstock, Monticello, Minn., former dean of the school of mines at the University of Minnesota, in an opening day address to the 500 attending the 3-day national gathering here.

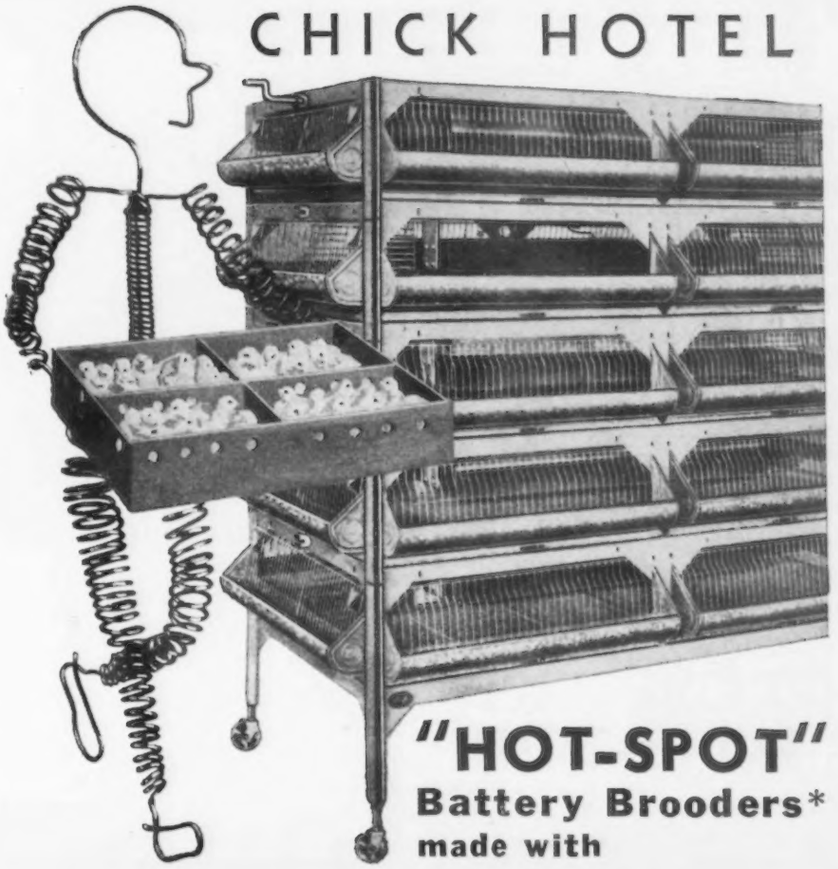
Of the frequently - expressed fears that Minnesota's range towns may become "ghost" towns in the not-too-distant future, Mr. Comstock said:

"During the last few years we have been informed through the press and radio, as well as in articles appearing both in popular and technical publications, that the reserves of iron ore in Minnesota are in danger of being depleted in a very short time. This prediction is based on a simple arithmetical computation. On May 1, 1945, the reserves of ore on the Mesabi range, as reported by the department of taxation, were 973,-130,000 tons. During the 5 years, 1941 through 1945, the average shipments were 63,167,000 tons per year. Simple division indicates that the ore will be gone in 15.4 years from May, 1945. The picture looks even less rosy for the direct shipping ores. The reserve of this class was reported as 486,-517,000 tons, with average shipments of 46,589,000 tons. Again division leads us to the conclusion that this ore will be gone in 10.5 years.

"However, like many another problem, there are too many considerations involved to permit of such a simple solution."

Among those considerations, Mr. Comstock cited: Shipments which would not approach wartime peaks in the postwar period; shipments dropped from a high of 75,300,000 tons in 1942 and an average of 67,750,000 tons per year for the preceding five-year period

CHICK HOTEL



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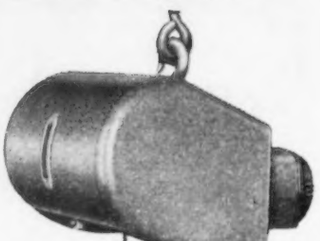

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to 50,010,000 tons in 1946; strikes, including those in the shipping and steel industries, as well as in the coal mines, being contributing factors; there is a definite upper limit placed upon the amount of ore which will be shipped by the capacity of blast furnaces and the shipping industry, both of which are retiring equipment they "made do" during the war; ores from other districts, including foreign sources, will be used along with Minnesota ores.

Principal reason for his belief in the longevity remaining for the Minnesota range, however, was the fact that many lower-grade ores than those principally used to date still remain.

"It is possible for a particular ore which would be useless to one furnace to be an ideal ore for another operating under different conditions," he said. "To the first furnace it would have no value, while to the second its value might be high. The value of an ore to a particular furnace determines what price that furnace is willing to pay for the ore."

Predicting that concentration methods will be developed to enable utilization of the less concentrated ore deposits at costs insuring profit, Mr. Comstock warned that:

"Before it can safely invest the money necessary, the mining industry must know what the tax burden will be and have definite assurance that it will not be increased at the whim of whatever political group may happen to be in power. The law which is now on our statute books is eminently satisfactory, but it is merely a law and can be amended or repealed at any time."

New Die Steels Out

Pittsburgh

• • • **The manufacture** of Desegatized brands of dispersed segregate die steels, claimed to possess an exceptionally high impact strength, has been begun by Latrobe Electric Steel Co., Latrobe, Pa. Four high carbon, high chrome grades are being produced, including modified chrome air hardening, high carbon, high chrome oil hardening, high carbon, high chrome air hardening, and special high carbon, high chrome, cobalt air hardening, types.

French Scrap Market Organized With Users To Stabilize Prices

Paris

• • • **To improve the** supply of scrap flowing to French steel mills and if possible eliminate the scrap black market a joint organization has been formed by dealers and steelworks. This body will centralize available resources, direct them to consumers, halt direct buying, and endeavor to improve the quality of scrap moving to mills.

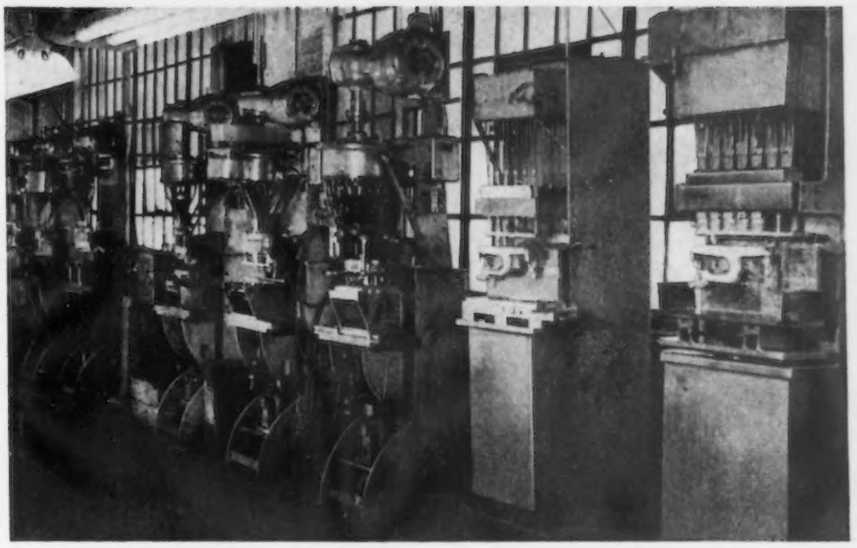
The price system for scrap is being revised on the basis of a producer's price, rather than a delivered price. Prices in the new list remain much lower in France than in most countries, and many sources here consider that present small collections may be a result of low prices.

An agreement signed in February of this year between dealers and the steel industry had presaged the complete organization of the French scrap market to stabilize prices, develop the handling and preparing of scrap, and assure that sufficient supplies would be available.

At the beginning of 1946 all controls on scrap movements were lifted except price control. This system has been rendered almost inactive by the increasing prevalence of black market operations. Steelworks have been paying premiums, and have been buying directly from producers.

Though the war brought about a great deal of destruction in Europe, with an apparent increase in scrap supplies, the shortage of coal and coke has greatly increased scrap consumption.

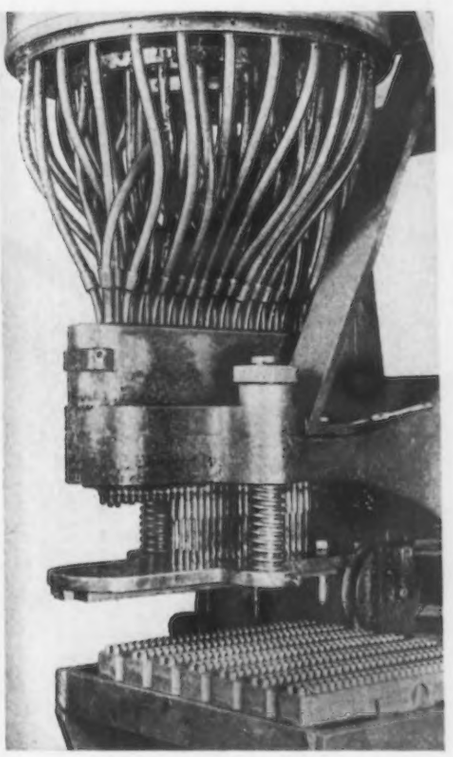
At present requirements of scrap for the French industry are estimated to be about 220,000 metric tons, while in 1938 the mills were obtaining only about 120,000 tons per month. There is not only a change in the quantity of scrap required but also in the qualities. Prepared scrap has been particularly short as facilities for preparations are limited to prewar needs. Home scrap was also lower than before the war as the steel operating rate during 1946 remained at 60 to 70 pct.



S.S.WHITE FLEXIBLE SHAFTS give VERSATILITY to this production line

General Gas Light Co., Kalamazoo, Mich., had the production problem of drilling many gas burner castings of different sizes and number of ports. They solved it by developing drilling machines with S. S. White flexible shafts as spindles. Close-up at right shows the spindles grouped for a particular casting. They can be quickly regrouped for different drilling requirements. The company's production engineer says, "Machines and spindles have proven out very efficiently. We never would have been able to meet our production requirements without them."

This use of S. S. White flexible shafts as a drive for machine parts which must be adjustable in position or in horizontal or vertical angles, is a good one for machine designers to remember. It's a simple, efficient answer to this problem.



Close-up of spindles grouped for drilling castings with 62 ports each, spaced 5/16". All 62 ports are drilled at one time. Drill sizes are Nos. 30 to 49. Total ports, 434. Drilling time four minutes.

Photos courtesy of General Gas Light Co. Kalamazoo, Mich.

WRITE FOR THE 260-PAGE HANDBOOK—It gives complete facts and technical data about flexible shafts and their application. A copy is yours free if you will request it on your business letterhead and state your position.

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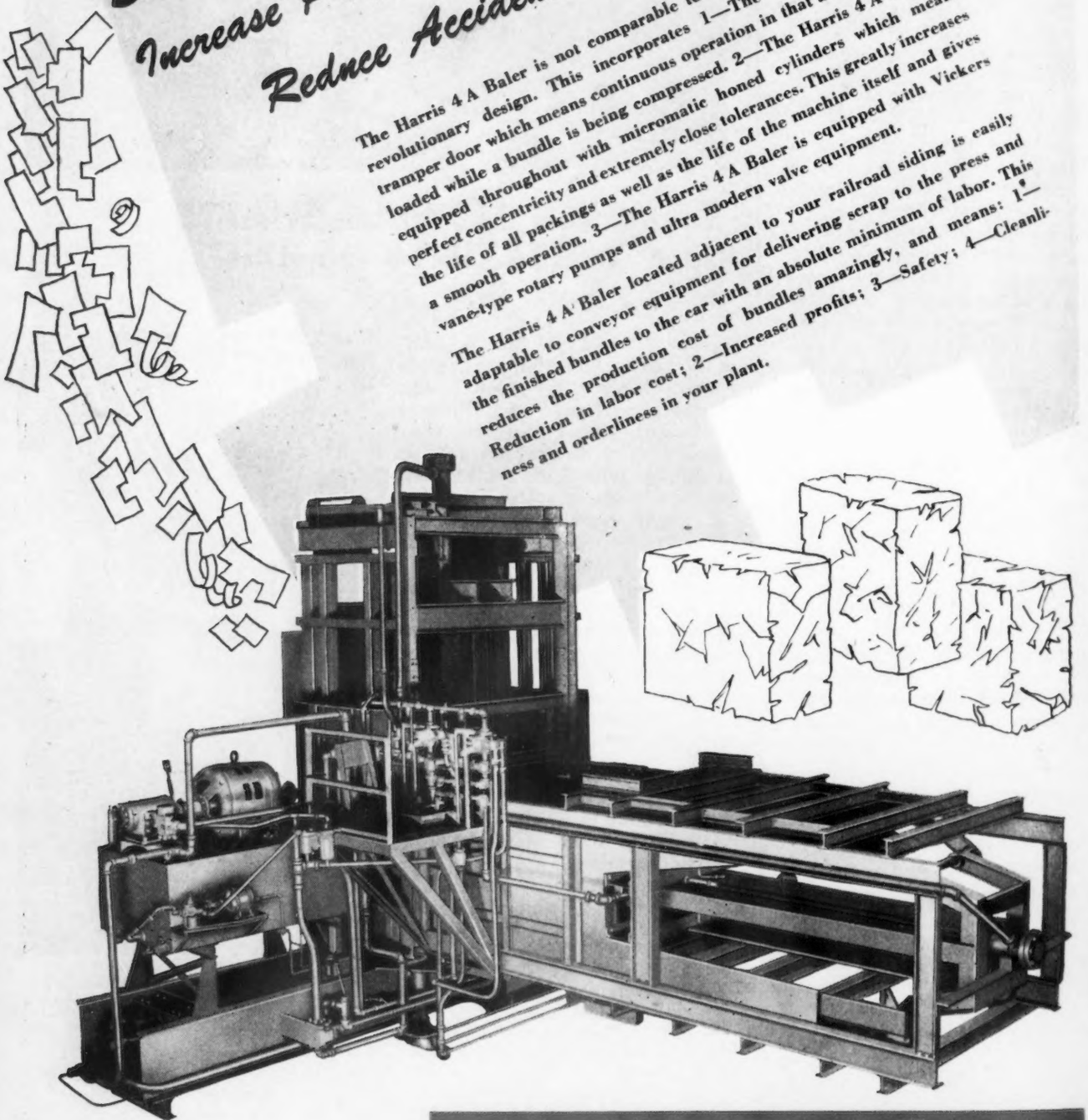
Increase Profits through Greater Efficiency

Reduce Accidents to a Minimum

The Harris 4 A Baler is not comparable to any other press due to its revolutionary design. This incorporates 1—The vertically operating tramper door which means continuous operation in that a charge can be loaded while a bundle is being compressed. 2—The Harris 4 A Baler is equipped throughout with micromatic honed cylinders which means perfect concentricity and extremely close tolerances. This greatly increases the life of all packings as well as the life of the machine itself and gives a smooth operation. 3—The Harris 4 A Baler is equipped with Vickers vane-type rotary pumps and ultra modern valve equipment.

The Harris 4 A Baler located adjacent to your railroad siding is easily adaptable to conveyor equipment for delivering scrap to the press and the finished bundles to the car with an absolute minimum of labor. This reduces the production cost of bundles amazingly, and means: 1—Reduction in labor cost; 2—Increased profits; 3—Safety; 4—Cleanliness and orderliness in your plant.



Harris Scrap Metal Baling Press Model 4 A

HARRIS FOUNDRY & MACHINE CO.

Reclamation Engineers Since 1889

CORDELE, GEORGIA